

# Prompt-engineering

September 7, 2024

## 1 Prompt engineering using Openai

```
[ ]: !pip install openai
```

Collecting openai

Downloading openai-1.35.13-py3-none-any.whl (328 kB)

328.5/328.5

kB 3.9 MB/s eta 0:00:00

Requirement already satisfied: anyio<5,>=3.5.0 in  
/usr/local/lib/python3.10/dist-packages (from openai) (3.7.1)

Requirement already satisfied: distro<2,>=1.7.0 in /usr/lib/python3/dist-  
packages (from openai) (1.7.0)

Collecting httpx<1,>=0.23.0 (from openai)

Downloading httpx-0.27.0-py3-none-any.whl (75 kB)

75.6/75.6 kB

6.2 MB/s eta 0:00:00

Requirement already satisfied: pydantic<3,>=1.9.0 in  
/usr/local/lib/python3.10/dist-packages (from openai) (2.8.2)

Requirement already satisfied: sniffio in /usr/local/lib/python3.10/dist-  
packages (from openai) (1.3.1)

Requirement already satisfied: tqdm>4 in /usr/local/lib/python3.10/dist-packages  
(from openai) (4.66.4)

Requirement already satisfied: typing-extensions<5,>=4.7 in  
/usr/local/lib/python3.10/dist-packages (from openai) (4.12.2)

Requirement already satisfied: idna>=2.8 in /usr/local/lib/python3.10/dist-  
packages (from anyio<5,>=3.5.0->openai) (3.7)

Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-  
packages (from anyio<5,>=3.5.0->openai) (1.2.1)

Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-  
packages (from httpx<1,>=0.23.0->openai) (2024.7.4)

Collecting httpcore==1.\* (from httpx<1,>=0.23.0->openai)

Downloading httpcore-1.0.5-py3-none-any.whl (77 kB)

77.9/77.9 kB

2.7 MB/s eta 0:00:00

Collecting h11<0.15,>=0.13 (from httpcore==1.\*->httpx<1,>=0.23.0->openai)

Downloading h11-0.14.0-py3-none-any.whl (58 kB)

58.3/58.3 kB

4.1 MB/s eta 0:00:00

Requirement already satisfied: annotated-types>=0.4.0 in  
/usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1.9.0->openai)  
(0.7.0)

Requirement already satisfied: pydantic-core==2.20.1 in  
/usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1.9.0->openai)  
(2.20.1)

Installing collected packages: h11, httpcore, httpx, openai

Successfully installed h11-0.14.0 httpcore-1.0.5 httpx-0.27.0 openai-1.35.13

```
[ ]: from google.colab import drive
drive.mount('/content/drive', force_remount = True)
```

Mounted at /content/drive

```
[ ]: messages = [{'role': "system", "content": "You are an amazing helpful_
↳assistant"},
                  {'role': 'user', "content": "who won ipl 2020"}]
```

```
[ ]: chat_repsonse = openai.chat.completions.create(
      model = "gpt-3.5-turbo-16k",
      messages = messages
    )
```

```
[ ]: chat_repsonse
```

```
[ ]: ChatCompletion(id='chatcmpl-9fmK0q82UWkPoN2dig98VgFGaY9B6',
choices=[Choice(finish_reason='stop', index=0, logprobs=None,
message=ChatCompletionMessage(content='Mumbai Indians (MI) won the Indian
Premier League (IPL) 2020.', role='assistant', function_call=None,
tool_calls=None))], created=1719744248, model='gpt-3.5-turbo-16k-0613',
object='chat.completion', service_tier=None, system_fingerprint=None,
usage=CompletionUsage(completion_tokens=19, prompt_tokens=24, total_tokens=43))
```

```
[ ]: chat_repsonse.choices[0].message.content
```

```
[ ]: 'Mumbai Indians (MI) won the Indian Premier League (IPL) 2020.'
```

```
[ ]: prompt = '''You are a helpful Neural Network teaching assistant.
Explain the various optimisation methods in Neural network.
Provide an exhaustive summary of the methods describing what they do,
and do provide sample code for each method and also guidelines on when to use_
↳which method.'''

message = [{"role": "user", "content": prompt}]

chat_response = openai.chat.completions.create(
```

```

    model = "gpt-3.5-turbo-16k",
    messages = message,
    max_tokens = 200,
    temperature = 0.5,
    n = 1,
    stop = None,
    frequency_penalty = 0,
    presence_penalty = 0
)

print(chat_response.choices[0].message.content)

```

There are several optimization methods commonly used in neural networks to train models effectively. These methods aim to find the optimal set of weights and biases that minimize the loss function. Here is an exhaustive summary of some popular optimization methods, along with sample code and guidelines on when to use each method:

#### 1. Gradient Descent (GD):

- GD is the basic optimization method in neural networks.
- It updates the model parameters in the opposite direction of the gradient of the loss function.

- The learning rate determines the step size for parameter updates.

- Sample code:

```

```python
learning_rate = 0.01
for i in range(num_iterations):
    gradients = compute_gradients(loss_function)
    parameters = update_parameters(parameters, gradients, learning_rate)
...

```

- Use GD when you have a small dataset or a simple model. It can be slow for large datasets or complex models.

#### 2. Stochastic Gradient Descent (SGD):

- SGD is an extension

```

[ ]: prompt = '''You are a helpful Neural Network teaching assistant.
Explain the various optimisation methods in Neural network.
Provide an exhaustive summary of the methods describing what they do,
and do provide sample code for each method and also guidelines on when to use_
↳which method.'''

message = [{"role": "user", "content": prompt}]

chat_response = openai.chat.completions.create(
    model = "gpt-3.5-turbo-16k",
    messages = message,

```

```

    max_tokens = 800,
    temperature = 0.5,
    n = 1,
    stop = None,
    frequency_penalty = 0,
    presence_penalty = 0
)

print(chat_response.choices[0].message.content)

```

There are several optimization methods commonly used in neural networks to train models effectively. These methods help in finding the optimal set of weights and biases that minimize the loss function. Let's go through each method along with a brief explanation, sample code, and guidelines on when to use them.

### 1. Gradient Descent:

Gradient descent is a basic optimization algorithm used in neural networks. It calculates the gradient of the loss function with respect to the model parameters and updates them in the opposite direction of the gradient to minimize the loss. The learning rate determines the step size for each update.

Sample code:

```

```python
# Assume weights and biases are initialized
learning_rate = 0.01

# Calculate gradients
gradients = backward_propagation()

# Update parameters
weights -= learning_rate * gradients['weights']
biases -= learning_rate * gradients['biases']
```

```

When to use:

- Gradient descent is a good starting point for most neural network problems.
- It is suitable for small to medium-sized datasets.

### 2. Stochastic Gradient Descent (SGD):

SGD is an extension of gradient descent where the model parameters are updated after each training example rather than the entire dataset. It reduces the computational burden and can lead to faster convergence.

Sample code:

```

```python
# Assume weights and biases are initialized
learning_rate = 0.01

```

```

# Iterate over each training example
for example in training_data:
    # Calculate gradients for the current example
    gradients = backward_propagation(example)

    # Update parameters
    weights -= learning_rate * gradients['weights']
    biases -= learning_rate * gradients['biases']
...

```

When to use:

- SGD is suitable for large datasets where computing gradients for the entire dataset is expensive.
- It can help avoid local minima due to the frequent updates.

### 3. Mini-Batch Gradient Descent:

Mini-batch gradient descent is a compromise between gradient descent and SGD. It updates the model parameters after processing a small batch of training examples. It provides a balance between computational efficiency and convergence speed.

Sample code:

```

```python
# Assume weights and biases are initialized
learning_rate = 0.01
batch_size = 32

# Divide the training data into mini-batches
mini_batches = create_mini_batches(training_data, batch_size)

# Iterate over mini-batches
for mini_batch in mini_batches:
    # Calculate gradients for the current mini-batch
    gradients = backward_propagation(mini_batch)

    # Update parameters
    weights -= learning_rate * gradients['weights']
    biases -= learning_rate * gradients['biases']
...

```

When to use:

- Mini-batch gradient descent is commonly used in practice and is suitable for most cases.
- It balances the computational efficiency and convergence speed.

### 4. Momentum Optimization:

Momentum optimization helps accelerate gradient descent in the relevant

direction and dampens oscillations. It accumulates a moving average of past gradients and uses it to update the parameters, allowing faster convergence.

Sample code:

```
```python
# Assume weights and biases are initialized
learning_rate = 0.01
momentum = 0.9
velocity_weights = 0
velocity_biases = 0

# Calculate gradients
gradients = backward_propagation()

# Update velocities
velocity_weights = momentum * velocity_weights - learning_rate *
gradients['weights']
velocity_biases = momentum * velocity_biases - learning_rate *
gradients['biases']

# Update parameters
weights += velocity_weights
biases += velocity_biases
```
```

When to use:

- Momentum optimization is useful when the loss function has high curvature or noisy gradients.
- It helps accelerate convergence and overcome local minima.

## 5. Adam Optimization:

Adam (Adaptive Moment Estimation) optimization combines ideas from momentum optimization and RMSProp. It adapts the learning rate for each parameter based on the first and second moments of the gradients. It is widely used due to its efficiency and effectiveness.

Sample code:

```
```
```

```
[ ]: chat_response = openai.chat.completions.create(
    model = "gpt-3.5-turbo-16k",
    messages = [{"role": "system", "content": "You are a helpful assistant who_
↳converts the output into json format"},
                {"role": "user", "content" : "top ten discoveries made by_
↳'Leonardo da vinci'"}],
)
```

```
output = chat_response.choices[0].message.content
print(output)
```

```
{
  "discoveries": [
    "Concept of a flying machine",
    "Anatomy of the human body",
    "Concept of the parachute",
    "Study of optics and physics",
    "Design of various technological innovations",
    "Hydraulic engineering",
    "Concept of a self-propelled cart",
    "Understanding of geology and paleontology",
    "Study of botany and plant growth",
    "Concept of a diving suit"
  ]
}
```

```
[ ]: import json

json_output = json.loads(output)

result = json_output.get("discoveries", "None")

print(result)
```

```
['Concept of a flying machine', 'Anatomy of the human body', 'Concept of the
parachute', 'Study of optics and physics', 'Design of various technological
innovations', 'Hydraulic engineering', 'Concept of a self-propelled cart',
'Understanding of geology and paleontology', 'Study of botany and plant growth',
'Concept of a diving suit']
```

```
[ ]: filepath = '/content/drive/MyDrive/Colab Notebooks/'
```

```
[ ]: with open(filepath + "AsianPaints.txt", "r") as f:
      transcript = ' '.join(f.readlines())
```

```
[ ]: print(transcript)
```

ASIAN PAINTS  
Q1 FY2024 Earnings Conference Call

Date : July 25, 2023

Management:

Mr. Amit Syngle

: MD & CEO

Mr. R.J. Jeyamurugan : CFO & Company Secretary

Mr. Parag Rane

: AVP - Finance

Ms. Sunila Martis

: Head - Investor Relations

Mr. Arun Nair

: Manager - Corporate Communications

Disclaimer: This is a memorandum of the proceedings of the Investor Conference of Asian Paints Limited held on Tuesday, 25th July, 2023 at

5:30 pm with regard to the financial results of the Company for the First quarter ended 30th June, 2023. While we have made our best attempt to prepare a verbatim transcript of the proceedings of the meeting, this document has been edited for readability purposes and may not be a word-to-word reproduction

Sunila Martis:

Good evening, all of you and thanks for joining us to discuss Asian Paints Q1 FY24 earnings. I

am Sunila Martis from Investor Relations. And I'm happy to welcome all of you here.

Today, we have with us our MD & CEO, Mr. Amit Syngle. We also have with us Mr. R. J.

Jeyamurugan, our CFO and Company Secretary. And we have Mr. Parag Rane, AVP-Finance

joining us. I would now like to welcome Amit for his opening comments.

Amit Syngle:

Hello, everyone. Welcome to the Investor Conference for Q1 FY24. It's a pleasure to be with all of you.

We have always spoken about delivering joy since 1942. And as a brand, we exist to Beautify,

Preserve and Transform all the spaces and objects, bringing happiness to the world. This is our

core value and we have been speaking about it in terms of where our brand is and where we

want to take the brand as we go forward.



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Overall, when we look at Q1 FY24, it has been a strong quarter from the point of view of

overall volume growth which we have been able to deliver. This has also been a consistent

promise and what we have been pursuing for the last 12 quarters. We registered double digit

10% volume growth. Over a four-year period, this was clearly a strong double-digit 17.5%

CAGR. Even the value number was relatively strong at about 8%. Please remember, that this

was over a very high base last year where we had grown by value of about 59%.

It was also a

price increase base and growing over a lower covid base of previous year, 8% on that is a still

a relatively healthy number delivered this quarter.

Similarly, the volume base was strong at 37% over which 10% growth has come in. We see

that across geographies, this is broad based growth giving us confidence that it was a strong quarter.

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When we look at the last few quarters, you will see that the result is consistent in terms of

looking at the volume base to growth. The 4-year CAGR over the various quarters have been

in the band of about 15-20%. This shows our commitment to overall growth, and we have

been keeping pace with the same over previous quarters.

Going ahead, let's take a look at some of the parameters on how we would qualify the quarter.

First of all, I think the good part is that compared to Q3, Q4 of FY23, we saw rural growth

definitely improving and coming closer to the urban markets, which was a good sign.

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We saw almost similar growth between the two. Over a period of time, we are seeing that the

4-year CAGR across rural urban areas are kind of same. The overall product mix was led by the

economy and premium range growing. The luxury range was a bit down, but both economy

and premium range did well.

In terms of specifics, we saw SmartCare waterproofing, which has been on a strong growth path over the previous quarters continue to maintain growth. The wood finishes, which is a strong area with lots of premium finishes also grew quite well. Enamels again which has a premium component, grew well and the economy emulsions which get into the bottom of the pyramid in terms of people coming in from the unorganized sector to the organized sector, did quite well.

Our distribution expansion in terms of increasing our footprint continued in a strong manner.

We had reported about 1.5 lakh retail points earlier till the end of last year. We have added good numbers of about 6,000-10,000 retail points in Q1 which is a signal to the market that we would like to keep up our presence in every geography as we go ahead, even with respect to the T3-T4 towns.

Services has been on a strong pitch, and I think this is something which differentiates Asian

Paints. Our Safe Painting Service (SPS), which comprises of the Trusted Contractor Service

(TCS) has done extremely well and now we are present in more than 650 towns with revenue

almost doubling in Q1. This signifies that today the trust levels of service are very high, and

we speak of a fairly high NPS score. Overall, from the point of view of retail versus projects

business, the projects/institutional business grew faster, and it was led by good construction

activity which propelled the builder sector. We saw good spending from government and also

factories did quite well. This B2B part of the business has been spearheading growth in a very strong manner for us.

From a point of view of innovation, new products have been fairly consistent, and we have

been speaking about the band of 11-13% contribution to the overall revenues This quarter,

also we saw about an 11% contribution. We have already announced that there are various

expenditures which we have committed in terms of going forward. We had spoken of about

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Rs. 8,750 crores to be spent over the next three years. And today the overall capacity

expansion has been going on pretty well and we are on schedule.

This slide gives a brief of the larger areas at work. I spoke about innovation and being a leader.

This is called Nilaya Naturals. This is a super luxury product at the highest point. This is

something which is an organic emulsion packed with 90% organic materials which are earthsafe with more than 200 shades. It's got a very good vintage matte look and is very popular

amongst architect designers and therefore this is our attempt to take on the super luxury

space and offer an organic and green product.

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We look at really enhancing décor on the walls in a very strong manner. These are a large set

of Italian finishes which we have introduced in the market and is very popular amongst the

AID segment. Some of these finishes are very expensive and in the super luxury category, at

the top-end of the market.

Some clear innovation products which have strong propositions. We are talking in terms of

luxury exterior paint, which comes with a 15+15+15 warranty, which is for durability, for algae

and for the waterproofing. We are looking at 'Hydroloc Xtreme', which can be applied on

almost 70% damp walls, a technological innovation. And lastly, an 'Anti Insect' paint that keeps

common insects away. So, all things which are really world class, including 'Purafin', which is

one of the PU finishes looking at the mid-premium segment of wood finishes, which for the

first time is coming in this range. So, as I said, every product here is in the premium and the

luxury range.

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Shifting from the 'share of surface' to the 'share of space' business, which

is our Home Décor.

This has been a journey which we have been pursuing over the last few years and we see

today we are at about 4% of our decorative revenue. And this is what we are steadily

increasing as we are going forward. Today, we have become clearly the number one integrated

home player in terms of offering customers décor under one roof through our 44 Beautiful

Homes (BH) stores which we have put across geographies in India. And this makes us very

strong in terms of catering to the customer, because as we said, Home Décor compliments the

coatings business because you are part of the consumer décor lifecycle.

We have become number two in the fabric and the furnishing business. We have a co-branding

arrangement with 'Pure' brand. We have got into areas like wallpaper through collaborations

with ace designers like Sabyasachi, Sarita Handa and have also done collaborations with

partners like Jaipur Rugs. We introduced the area of lighting and flooring and also the doors

and windows with uPVC. We are number one in wall coverings and texture. So, what you see

is that literally in terms of most of the categories, you are becoming amongst the top two

players in the market, including becoming the number one player in the integrated décor area.

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We already have a Kitchen and Bath business which has been there. The Kitchen business has

been doing well. We experienced a growth in the FKD business, but the components business

was slow. We had a high price increase base last year and therefore from that point of view,

we had a 12% de-growth in terms of our revenue. As far as the PBT is concerned, we improved

our margins in the Kitchen business, and we were at about a minus Rs. 2 crores, kind of an

overall PBT. As far as Bath is concerned, again Bath was affected by a strong price increase

base, and we almost have a breakeven here against a Rs. 4 crores profit which we had last year.

So, I think we were quite affected given the fact that the bases were high because of the price increase. We feel that next quarter would be much better in terms of the two businesses going forward.

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Luxury kitchens, which are being launched under the 'Crest' brand by Sleek, is something in the range of about Rs. 12-15 Lacs per kitchen. Again, a lot of work happening at the luxury end here.

We also have now our 'Nilaya' furniture, which is having European sensibilities with Indian comfort.

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Strong introductions which have been made at our BH stores and are getting very popular.

We have also launched fitted furniture, which consists of vanity units in terms of crockery, entertainment units and so on, so forth. This is a new launch along with the wardrobes in terms of our BH stores. It completes the various areas of aspiration of a consumer.

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As far as the two new acquisitions are concerned - White Teak did extremely well at almost about 28.4% growth. We also had good profitability in terms of PBDIT from this business. We have added more stores, both company owned and franchise owned stores, apart from the fact that the 44 BH stores are selling White Teak. We have acquired another 11% additional stake in June 23, taking our share to about 60% now. So, it has become our subsidiary. As I said earlier, we are number one in terms of decorative lighting here.

As far as we look at Weatherseal, last year we had doubled the sale and this year also we are doing quite well. We have already registered about Rs.9.8 crores of net sales and therefore

expanding these businesses. Both the businesses have, done very well in Q1 and we have strong hopes in terms of taking it ahead in terms of what we want to do.

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Some snaps of a new format of Beautiful Homes store, called the Beautiful Homes Studio. This is the next frontier of our journey on home décor. This store has come in Chennai in Anna Nagar and it's about 17,000 square feet. This store is comparable to a store which would be in Paris, London or New York and very high-end luxury. It has really taken Chennai by storm. It is really high-end from the point of view offering - decorative lighting, furnishing, furniture and lots of other areas. So, I think this is our journey towards taking the luxury end again, in a strong manner as we go ahead.

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When we look at the International business, it comprises of our operations in Asia, Middle East, Africa largely.

It was a mixed bag in terms of the International business. If we look at the businesses in Middle East and in Africa, we did quite well, including South Pacific. I think where we were hit was Asia, largely in the case of Nepal, where there is a little bit of an economic crisis going on. There's a liquidity crunch and I think that is where we de-grew and this had a quiet of effect on the overall Asia business, and it also had an effect on the overall global business. In fact, what we have been seeing is that in some of the markets like Bangladesh, Lanka and Egypt, there has been devaluation of currency. So, if you were to see this degrowth of 1%, but you were to convert it into constant currency terms, it comes to about 4% growth. So, in that sense, I think the overall business is still about 4% positive.

As far as profitability goes, a large part of profitability comes from Nepal. And as I said, the Nepal market has been down. Overall, we registered lesser profits from last year, but there

was still overall profits of about Rs. 27 crores in this year. PBT levels have dropped down, but

we are hopeful that Asia recovers as we go forward because a lot of business comes from

Nepal, Bangladesh and Lanka in our international foray.

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Going ahead, our Industrial business has been the star business in Q1. Very strong top line

growth coming in. The PPGAP business, which is the business which caters to auto OEM and

refinishes market has done extremely well at about 13% top line growth with both auto OEM

and refinish segment doing quite well. We have got good realizations in the market from the

point of view of our prices, which we had with our B2B customers. There has been an effect

of the softening of the raw material prices a little bit, which has led to a strong number coming

in terms of PBT. The number is heartening and augurs well for us.

When we look at the other business which is the General Industrial business, which is APPPG,

I think the growth has been consistent. If you look at the last 10 to 12 quarters, it has been

growing in double digits and we delivered almost Rs. 300 crores here with 22% growth. The

profitability numbers were also strong which was aided by the softening of the raw material

prices and a lot of work in terms of improving margins. Both businesses are growing from

strength to strength and this is really adding to the brand in a big way.

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So, if you look at gross margins - we are looking at almost a 9-quarter high. We have seen

deflation in Q4 FY23 and we have seen deflation of about 2% in the current Q1 of FY24. We

see that the overall gross margins have gone up to about 43.4%. And this has been also aided

by a lot of work which we have been doing with respect to the formulation and sourcing

efficiencies. So, this is a strong number as far as the overall gross margins are concerned.

In totality, with respect to the financials at a standalone level, if we look

at the top line, it's

about 7% growth led by double-digit almost 10% volume growth. As far as the gross margins

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are concerned, we are almost up by 550 bps. If we were to look the point of view of last year,

same quarter I think very strong 43.4% margin. If we look at PBDIT margins, they have gone

to 24.7% from 19.4% in Q1 last year. And sequentially also, they have gone up by about 170200 bps. So stronger growth happening with respect to margins aided by some softening in

terms of the prices. But this has obviously given a lot of impetus with respect to PAT numbers

in terms of what you are seeing on screen.

At a consolidated level, the numbers are not too different. Obviously, top line is more or less

close to the standalone number of 7%. Again, gross margins are strong at about 42.8%, a 530

bps improvement. At PBDIT compared to last year Q1 at 23.2 against an 18.1 number and

even on a sequential last year quarter, we see a gain of about 190 bps. PAT has been fairly

strong in terms of what we have been able to see. There has been a one-time adjustment

which we have indicated as a note in the financials. But overall, even if we were to take that

one-time kind of benefits out, the growth in terms of both PBDIT as well as the overall

numbers has been quite strong.

So, what we are saying overall is we have had a good start as far as FY24 is concerned. Our

foray of double-digit volume growth continues, which gives us confidence in terms of our

performance. Home Décor, while Kitchen and Bath have been a little bit sluggish, but overall,

a plethora of other categories like fabrics, lighting, uPVC, all kind of giving us good growth and

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we think as a combined business this is something which is galvanizing us and giving us

strength with respect to our core business. As I said, it is making us part of the consumer life

décor journey. The Industrial business on a clear uptick, giving us double-digit revenue growth



and this is a business which has been growing at this rate for the last few quarters and

therefore clearly the journey has been strong in terms of what we see going ahead.

International, a little bit less up to our expectations, but I think the forex tightness, the

devaluation and so on, so forth are a bit of a challenge, but we still see that if we are able to

kind of overcome Asia business, I think it will give us good growth and good profit as we go ahead.

Overall, from the point of view of operational efficiencies, a lot of work is happening both

from the point of view of sourcing and formulation and I think this is adding to the softening

of the raw material prices and giving us benefits. So net net, a great start.

On to ESG, I think all of you would have seen our annual report, which has a strong component

of intertwining business with ESG numbers. I think strong progress with respect to the three

areas of Environmental, Social and Governance in terms of what we have taken up and I think

these areas are something which we are steadfastly pursuing within the organization.

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If you look whether from the point of view of water replenishment, or with respect to energy,

which is renewable electricity or with respect to the certain areas typical to the chemical

industry in terms of hazardous waste or effluent generation or in terms of Scope 1 & 2

emissions, I think the progress has been very strong. What you see is what we have achieved

in FY23 and then we have looked at two buckets, which is the 2025 bucket which you see in

grey, and the pink bucket, which is the 2030 bucket. So overall it's the audacity of the brand

that we are committing upfront to the ESG framework. On the Social front also, a lot of work

is being done in terms of being water positive and we are getting into a lot of areas which

generate some water in the environment. We are also looking at the area of health care

initiatives and training people from the point of view of making them win

livelihoods. This is  
a strong area of focus for the organization as we go ahead.

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Lastly, I think all of you would be quite eager in terms of knowing our outlook. The Indian economy is still pretty good as compared to what we are seeing in terms of the world economy, whether it is Europe or US or even China and we will continuously push for aggressive growth. Our growth focus definitely would remain. As I said, the rural demand has been good in Q1 and we see that given the fact that the monsoons today are appearing to be quite good, we would be banking on rural growth going forward.

Raw material prices, while I think they have been going down, we are seeing some increases. Crude is at an all-time high in terms of what we see., We do not know what trajectory the dollar and the rupee take as we go ahead. So, we are watching the environment and seeing where is the raw material stabilizing, and then we will take a call on our pricing going ahead.

As far as the festive season is concerned, we are looking at it very, very strongly because this time we have a longer season and therefore we think it should be a good season.

Our Home Décor initiatives are strong, and I think they will keep multiplying going ahead and the Industrial business will keep on adding to the overall décor business.

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As I said, I think we are a little bit watchful on the International geographies because unless for us, Nepal and Bangladesh, kick off strongly, I think the Asia business would remain suspect. But I think we are hoping that they also turn around the corner and it should be good going forward.

So overall, we have a good outlook going forward in terms of how we are looking at the coming quarter and therefore looking at the performance in H2 in a strong way. Thank you so much.

Moderator:

We now begin the Q&A session.

Abneesh Roy (Nuvama):

My first question is when I see your gross margin that is at a 9-quarter high and when I see other FMCG categories like soaps and detergent, wherein also the gross margin expansion has happened, local and regional players have come back strongly in terms of either pricing or in terms of local marketing. So, could you take us through what is happening in the 30% local market share, which is there. Are you seeing players cutting prices, for example, and are they also starting more of advertising and what is your response to that? Because that's a large market and you are equally aggressive in the lower end of the market.

Amit Syngle:

For us, the bottom of the pyramid is a very strong market, and we look at getting the unorganized customer into the organized brand. Our work emanates in two manners. One is in terms of expanding our footprint so that we are able to reach out to smaller towns. Second, we have a very strong program in terms of below the line marketing initiatives, in terms of what we place in the market. So, whether it is work around influencers, whether it is the work around wooing the consumer, or it is with respect to even the work in terms of looking at brand displays at the shops, I think we do a huge amount of work there too, so a large expenditure possibly goes. Similarly, I think the differential schemes to woo the retailers to stock the material and sell them at a strong incentive to the customers is what we do. So, our concentration has been led by below the line initiatives and topped with a focus on 'Above the line' advertising.

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Going forward, we are looking at giving an impetus to our advertising and looking at these below the line initiatives. What we see very clearly, is the strength of the brand where we are able to command a premium with respect to selling prices and despite the fact

that we see

some discounting by local players and in some cases also advertising. Today our Q1 results also

indicate in that segment we are able to really get good numbers and good response. So, I think

net net our initiative of 'Above the line' and 'Below the line' will continue in a strong manner.

We would be strong with respect to our initiatives in terms of what we want to put to woo the

consumer and we might even look in terms of saying that as we go forward, depending on

how the raw material prices fare out, we will look if we need any price corrections.

Shirish Pardeshi (Centrum):

I do understand on a base of 37% volume growth, the volume is about 10% growth. But just

wanted to understand, because you made some remark, that the premium luxury segment is

not to the expectation in the middle and lower end is grown faster. Is this the industry trend

because the local competition has picked up very well and I think there is a pressure and

obviously the demand is high at the lower end. And in that context, I think I do understand

you have prioritised the gross margin and do you think in the medium term we have a pressure

to drop the prices?

Amit Syngle:

There is no middle and lower end premium and luxury. There are only three segments:

economy segment, premium segment and luxury segment. What I said was that the economy

and the premium segments are doing well, and the luxury is a little bit down. If you look at

the market constraint, the economy segment is the biggest segment which is there, followed

by premium and luxury. And therefore, you will have to perform in the economy segment if

you are looking at overall volume and value growth in terms of turning the tables. I think the

premium segment has also done fairly well, riding on wood finishes, riding on adhesives and

riding on enamels.

Overall, we think the premium segment has been strong. I think the decision with respect to

pricing is totally related to how the whole area of raw material prices pan out. We are now

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seeing some resurgence in crude prices, they are at an all-time high in terms of what we see.

Some parts of the raw materials are also going northwards. So, we are watching it carefully

and if the trends are clear, we would look at price correction in that case. Having said that, we

are not seeing local companies, at least in the paint industry, doing very well. Possibly we

would have gained from some of the local competition in terms of the overall economy segment.

Shirish Pardeshi (Centrum):

On the non-decor part, the Industrial business and Home Improvement, The Industrial

business has shown momentum. So, in your sense, is it completely normalized because auto

OEM and auto refinish business has done exceedingly well, despite the high base. In that

context, is there further recovery expected or this is the normalized base and we can build on

this. And second, on the Home Improvement, exactly what has gone wrong, because both

Sleek and Ess Ess have declined very sharply.

Amit Syngle:

When we look at the Industrial business, I don't think it has reached a place where it cannot

grow and we did not have any price increase bases there. I think they were normal bases in

terms of what we saw last year. The General Industrial business comprising of Protective

paints and Powder coating is something which is on the rise, and I think what we see is that

not many industries are coming up. Players are expanding and we see a lot of opportunity in

the government infrastructure business, which is also seeing a lot of money getting pumped

in. As far as auto is concerned, I think both two-wheeler and four-wheeler, we are seeing

strong growth with the additional lines, the whole area of EV coming up and so on and so

forth. Both businesses are promising that the uptick should continue in terms of the overall

demand as we go ahead.

As far as the overall Home Décor business is concerned, four categories have grown and two categories are down. So, I don't think things are terribly wrong there. In the two businesses, which have degrown a little, we had very high bases because of price increases and that could possibly get corrected as we go ahead in Q2 and Q3.

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As far as the Kitchen F&D business is concerned, we are buoyant because we are number one in terms of that F&D business. And even with respect to the Bath business, I think it will definitely come up going forward. So overall, I think net net, four categories have done well very clearly in terms of what is there and two categories have gone down. Overall, Home Décor, had a fairly good growth.

Shirish Pardeshi (Centrum):

So, you think second half is going to be better as compared to the Q1 weakness?

Amit Syngle:

We think the business would definitely improve because the weakness was coming also because of a little bit of a base which was very high. So definitely there will be an improvement.

Avi Mehta (Macquarie):

I just wanted to build on the margin point a little. Basically, are there any one-offs in the other expenses that we saw this quarter? And the second also related is because you are pointing towards resurgence of input costs, would you suggest that the current gross margin performance is something that could be at risk?

Amit Syngle:

If you take the two one-offs which were there, one is in terms of some dividend income which we got from our industrial JV and the second has been a provision reversal with respect to sick leave entitlement in terms of the positive change for our employees going forward. I think

if you take out the one-offs, the margin position is still healthy. So, I don't think the one-offs

are really influencing the numbers in a strong manner. And secondly, the overall margin

numbers are also closely governed by how raw material prices pan out in the market. You have

seen that during the whole period of inflation, when the inflation levels had gone to about 20-30% levels, despite taking price increases, the PBDIT margins had gone almost to about 15-16% levels. Today the raw material prices and the environment makes a huge impact with

respect to that. We feel that for the year, our commitment to the overall band of the PBDIT

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remaining between 18-20%, should be sacrosanct. That is something which we are committing

for the year, and which should remain.

Avi Mehta (Macquarie):

I was just trying to push the bubble by saying that given one does not have a material one

time, what we saw almost about 23% margin, that logically one does not see any risk to that

continuing and hence there could be possibly an upside risk to your guidance?

Amit Syngle:

You are right as it depends also in terms of if we really look at some changes with respect to

pricing in other areas, then possibly it would, come down and might not remain in this level.

I mean if there is going forward in H2, we see a larger inflation kind of coming back. But I think

we are in a good positive band in terms of what we are looking for the year.

Avi Mehta (Macquarie):

Just a clarification. The festive demand strength should reflect in the next quarter because the

channel gets filled. So, the longer festive period benefit should flow through in the second

quarter. Is that understanding correct?

Amit Syngle:

What happens is that retail season is about at least about 45 days before the festival. So, if

Diwali is in the first week of November or in the first ten days of November, normally what

happens is that the period from 15 September to October end would be a strong

retailing

season. We feel that the larger impact would come into Q3, but impact should come into Q2

as well because there is a retailing period which gets impacted by the festive area. So, we

would see that both quarters show an uptick with respect to the long festive season.

Sheela Rathi (Morgan Stanley):

My first question was with respect to the distribution, the dealer network, which we have

added this quarter about 6,000 dealer points and this year we have guided to about 10,000-15,000 dealer points. Just wanted to understand we are looking to get more into smaller cities.

So here what I wanted to understand is do we have a number in mind in terms of how many

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Asian Paints dealers, a small town could have? And in general, how long does it take for the

dealer to generate the requisite ROI? And has there been any change in terms of the timing

on generating the ROI; because, companies like yours and other competition are also talking

about being more aggressive with respect to adding the dealer points.

Amit Syngle:

What we see is that today the opportunities obviously in terms of the dealer and retail points

is that we keep on looking at not only the smaller towns which are coming up, but we are also

looking at a lot of suburbs of the bigger cities, which are expanding. So, it's a combination of

looking at retail points coming at both these points. What we also feel is that today, it's a

journey in terms of how the retailers start. They might do a certain amount of business in a

year and they kind of keep on growing progressively over the next 3-5 years and therefore the

drop out of a dealer, from the point of view of year one dealing with us to kind of going to

year three, year four is not very high because we look at putting in a tinting mechanism, which

gives them the flexibility of earning more money given the fact that the retailer is able to cater

to a larger range of SKUs which he can offer to the customer.

In our experience, what we feel is that this is a kind of journey which will



continue given the vastness of our country and given the opportunities of now the larger road network, government infrastructure, the way it is developing. I think the opportunities are fairly huge. For example, if you look at the entire J&K portion today and the opportunities that have opened are very big. Similarly, look at North East, given the connectivity of roads which is coming. So, I think these areas of expansion are going to continue and we feel that right from year one onwards, people get their ROI because at Asian Paints, we offer them a very, very high rotation of inventory and they keep on growing as the years go by. Some 5% of the retail network might drop out because of some liquidity crunch or some other personal problems which might come in. But overall, I think the business model is pretty strong.

Sheela Rathi (Morgan Stanley):  
And we have not seen any change in terms of the pattern it was say three years ago in terms of, you know the competitive intensity among the dealers.

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Amit Syngle:  
No, I don't think so, because the expansion really continues only because of the fact that, overall connectivity, the whole economic activity is only increasing. I think the consumption is also going higher given housing, which is coming, and I think we will not see any change in this for the next 5-10 years.

Rishi Mody (Marcellus):  
My first question is we have seen the Kitchen and Bath business kind of struggle to scale up immensely. If you could take us through the journey, what have been the challenges? What are the bottlenecks today. How are we solving it and where are we in the journey before we can push the pedal on the gas to scale this up massively?

Amit Syngle:  
When you look at the last three years of journey, first year in Kitchen and Bath, we grew almost about 35%. Second year again, we would have grown at about 30-35%. Last year we

grew

almost about 10-15%. So last year was a bit slow and this year in the first quarter, we are

seeing to some extent the business slowing down because of the large base.

So, I would not say that the business has not grown. I think last three years, the combined

business of the two entities is close to about Rs. 830 crores. Therefore, this business has grown

from about Rs. 500 crores to about Rs. 830 crores, and I think that's a good increase, which

we have seen in the last three years.

As we go ahead, we should be able to add good overall growth. Kitchen also has a hardware

business to it, which is called the components business, which also contributes to about 40%

of the total Kitchen plus components business. This is the business that just kind of slowed

down in the market because of certain price changes we implemented. And also, as I said, that

these price changes were done in the last year, first quarter. So overall, I think for both

categories, we are still fairly buoyant in terms of what we see and more buoyant towards

Kitchen because it is in sync with our strategy on Home Décor, when we look at our Beautiful

Homes stores. 44 stores today across the country, and these stores are going to about 65-70

stores this year.

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And therefore, we feel that these stores will also give an impetus to both categories, along

with the projects B2B business. Overall, we still see that these two businesses from a

trajectory are going to be strong because the opportunity is huge.

Rishi Mody (Marcellus):

So just wanted to get the clarification. You are happy with 30% growth rate for this Kitchen

and Bath business? You don't have aspirations for doubling of business year on year. Like, if

you have those aspirations, what are the bottlenecks for doubling or multi fold growth in this

category?

Amit Syngle:

Happiness is a relative state of mind. I might be happy with tripling business also going forward, but you need to be practical in terms of the way you want to grow and not really strain the system. We have just put additional capacity for both the Kitchen and the Bath which has come up in Maharashtra so that we are able to really put a strong impetus. Going forward, we are happy if we are able to grow the business by about 25-30% each year. That's a fairly healthy rate in terms of growth. In terms of what we see. I think the idea here is that you look at strong consumer propositions and you look at possibly equipping your stores in terms of really carving a niche for yourself. So, I think we are taking really measured calls in terms of the way we want to kind of go. And as I said, I think we should be happy in terms of getting about 25-30% growth in this segment, which should be a good indicator in terms of our overall growth. We have always said that going forward, the whole Home Décor segment should be closer to about 7-8% of our decorative sales as we look at FY26. So, at the end of FY26, that's the number we are gunning for. And I think that would be a strong number if we are able to reach that.

Rishi Mody (Marcellus):

Secondly, there have been a bit of a changes at the Board level. We have a new Chairman and we also have a new member joining the board. So just wanted to get your understanding on what are both of these guys bringing to the respective roles, that they've been assigned? How are you viewing this appointment?

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Amit Syngle:

This is in regular course. We have Mr. Deepak Satwalekar, who was the Chairman. His term comes to an end in September end and therefore we had to announce the new Chairman and we have Mr. R. Seshasayee who takes the Chair. He comes with a rich background in terms of heading Ashok Leyland earlier and being at the helm of lot many other companies, including

Infosys. He comes with a very strong area of expertise and I think has been a strong directional leader at Asian Paints in terms of his contribution to the Board. So, I think that's the kind of transition in terms of what we are seeing, which is a natural transition and a strong one too.

Second is that we have one of our Directors who we had completed his term, Dr. S Sivaram, and in place of him, we are taking Mrs. Ireena Vittal. She comes in again with strong experience. She has been with HDFC and other boards like Wipro. She brings in a strong area of capital to really energize us from the point of view of our thought with respect to newer businesses, technologies and also with respect to the overall financial kind of management. So, I think that's the thought in terms of looking at these two people.

Rishi Mody (Marcellus):  
Alright, and finally, just a bookkeeping question. When we say NPD contribution, is 11% of sales, how do you define the NPD? Like, what period of launch were these products launched within?

Amit Syngle:  
So normally it takes us almost about 1-2 years to kind of launch the product and then sustain it. So, we normally define it as NPD over 3 years. So that's how a new product is defined.

Amit Rustagi (UBS):  
I have a question relating to margins. If you look at the Q1 margins, they were pretty strong vs. of a guided range of 18-20%. So, what do you think is the best utilization of margin from here? Would it be more channel discounting or reinvestment? Or you think the price cuts? So, what do you think is the status quo. What do you like to achieve from the excess margins you have?

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Amit Syngle:  
We don't really act on quarter to quarter in terms of the margins you get, because you have

seen the last two years, given the inflation, I think the margins had gone even lower than that

band. We take a considered view in terms of how the margins are emanating and whether

they are stable from a point of view of overall business and environment. We would obviously

be aggressive with respect to our 'Above the line' and 'Below the line' programs. In terms of

what we do in marketing and our share of voice in the market, our media spends and our

other marketing activities, including, various measures on really exciting the market through

various schemes and discounting mechanisms. I think that is first and foremost because we

are committing ourselves to growth and we will not let that growth go away. And we are pretty

aggressive about that in terms of our thought.

Overall, as we go ahead, depending on how the raw material prices pan out, how the rupee

dollar parity pans out, we might look at even pricing corrections. But I think we will really be

watchful in terms of seeing what is there and just not react quarter to quarter. I think we take

a considered call in terms of going forward. And that is something which possibly is the right

mechanism, as we see from the Asian Paints point of view.

Amit Rustagi (UBS):

My second question is, if we have to resort to a price pass to the consumers, we have seen in

some of the consumer companies, the channel inventories get impacted and the channel

inventory comes down impacting the primary sales. What do you think in our case, how the

price cuts will be implemented and how would the channel react to those price cuts?

Amit Syngle:

So as far as Asian Paints is concerned, I think we don't depend on channel inventories a lot

because our channel inventories are to a minimum level because of the fact that we are able

to service the retailer at least almost about two times in a day. And therefore, I think we don't

really encourage too much loading the retailer in terms of inventories. However, in some

months, if there are stocking months and if there is any price corrections, we

are willing to  
give concession to the retailer in terms of a back linkage, which happens on  
certain stocks. I  
think it is something which goes in conjunction in terms of really seeing that  
both the  
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organization, the brand and the retailer, all benefit from what we are doing.  
So, I think the  
considered call is very clearly that we take them along with us so that even if  
they have stocked  
for some time, they should not be at a loss in terms of that stocking.

Moderator:  
Thank you so much for all your questions. Requesting Mr. Amit Syngle to please  
give his closing  
remarks.

Amit Syngle:  
It was good hearing questions coming from your side. It's been a good quarter.  
I think we are  
fairly satisfied with respect to the kind of overall numbers which have come  
in. We are looking  
forward to the long, festive season. And we feel that today the Indian story is  
still live in terms  
of the overall demand conditions. Good monsoons coming is also a positive  
indicator. The  
coming period should be a good one, as far as overall business goes. Thank you  
so much for  
coming and being with us today.

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[ ]: base_instruction = '''You are a helpful assistant which helps financial_
    ↳analysts retrieve
relevant financial and business related information from the documents.
Given below is a question and the transcript of an earnings call of a paints_
    ↳company called 'Asian paints',
which was attended by the top management of the firm.
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Try to give answers with specific numbers and facts wherever possible.
If you are not sure about the accuracy of the information, just respond that
    ↳you do not know'''

question = "How much asian paints business have grown this year compared to the
    ↳previous year?"

prompt = f"{base_instruction}\n\nQuestion: {question}\n\nTranscript:
    ↳\n{transcript}"

print(prompt)

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You are a helpful assistant which helps financial analysts retrieve relevant financial and business related information from the documents. Given below is a question and the transcript of an earnings call of a paints company called 'Asian paints', which was attended by the top management of the firm. Try to give answers with specific numbers and facts wherever possible. If you are not sure about the accuracy of the information, just respond that you do not know

Question: How much asian paints business have grown this year compared to the previous year?

Transcript:

ASIAN PAINTS

Q1 FY2024 Earnings Conference Call

Date : July 25, 2023

Management:

Mr. Amit Syngle

: MD & CEO

Mr. R.J. Jeyamurugan : CFO & Company Secretary

Mr. Parag Rane

: AVP - Finance

Ms. Sunila Martis

: Head - Investor Relations

Mr. Arun Nair

: Manager - Corporate Communications

Disclaimer: This is a memorandum of the proceedings of the Investor Conference of Asian Paints Limited held on Tuesday, 25th July, 2023 at

5:30 pm with regard to the financial results of the Company for the First quarter ended 30th June, 2023. While we have made our best attempt to prepare a verbatim transcript of the proceedings of the meeting, this document has been edited for readability purposes and may not be a word-to-word reproduction

Sunila Martis:

Good evening, all of you and thanks for joining us to discuss Asian Paints Q1 FY24 earnings. I

am Sunila Martis from Investor Relations. And I'm happy to welcome all of you here.

Today, we have with us our MD & CEO, Mr. Amit Syngle. We also have with us Mr. R. J.

Jeyamurugan, our CFO and Company Secretary. And we have Mr. Parag Rane, AVP-Finance

joining us. I would now like to welcome Amit for his opening comments.

Amit Syngle:

Hello, everyone. Welcome to the Investor Conference for Q1 FY24. It's a pleasure to be with all of you.

We have always spoken about delivering joy since 1942. And as a brand, we exist to Beautify,

Preserve and Transform all the spaces and objects, bringing happiness to the world. This is our

core value and we have been speaking about it in terms of where our brand is and where we

want to take the brand as we go forward.

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Overall, when we look at Q1 FY24, it has been a strong quarter from the point of view of

overall volume growth which we have been able to deliver. This has also been a consistent

promise and what we have been pursuing for the last 12 quarters. We registered double digit

10% volume growth. Over a four-year period, this was clearly a strong double-digit 17.5%

CAGR. Even the value number was relatively strong at about 8%. Please remember, that this

was over a very high base last year where we had grown by value of about 59%.



It was also a price increase base and growing over a lower covid base of previous year, 8% on that is a still a relatively healthy number delivered this quarter.

Similarly, the volume base was strong at 37% over which 10% growth has come in. We see that across geographies, this is broad based growth giving us confidence that it was a strong quarter.

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When we look at the last few quarters, you will see that the result is consistent in terms of looking at the volume base to growth. The 4-year CAGR over the various quarters have been in the band of about 15-20%. This shows our commitment to overall growth, and we have been keeping pace with the same over previous quarters.

Going ahead, let's take a look at some of the parameters on how we would qualify the quarter.

First of all, I think the good part is that compared to Q3, Q4 of FY23, we saw rural growth definitely improving and coming closer to the urban markets, which was a good sign.

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We saw almost similar growth between the two. Over a period of time, we are seeing that the 4-year CAGR across rural urban areas are kind of same. The overall product mix was led by the economy and premium range growing. The luxury range was a bit down, but both economy and premium range did well.

In terms of specifics, we saw SmartCare waterproofing, which has been on a strong growth path over the previous quarters continue to maintain growth. The wood finishes, which is a strong area with lots of premium finishes also grew quite well. Enamels again which has a premium component, grew well and the economy emulsions which get into the bottom of the pyramid in terms of people coming in from the unorganized sector to the organized sector, did quite well.

Our distribution expansion in terms of increasing our footprint continued in a strong manner.

We had reported about 1.5 lakh retail points earlier till the end of last year. We have added

good numbers of about 6,000-10,000 retail points in Q1 which is a signal to the market that

we would like to keep up our presence in every geography as we go ahead, even with respect

to the T3-T4 towns.

Services has been on a strong pitch, and I think this is something which differentiates Asian

Paints. Our Safe Painting Service (SPS), which comprises of the Trusted Contractor Service

(TCS) has done extremely well and now we are present in more than 650 towns with revenue

almost doubling in Q1. This signifies that today the trust levels of service are very high, and

we speak of a fairly high NPS score. Overall, from the point of view of retail versus projects

business, the projects/institutional business grew faster, and it was led by good construction

activity which propelled the builder sector. We saw good spending from government and also

factories did quite well. This B2B part of the business has been spearheading growth in a very

strong manner for us.

From a point of view of innovation, new products have been fairly consistent, and we have

been speaking about the band of 11-13% contribution to the overall revenues This quarter,

also we saw about an 11% contribution. We have already announced that there are various

expenditures which we have committed in terms of going forward. We had spoken of about

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Rs. 8,750 crores to be spent over the next three years. And today the overall capacity

expansion has been going on pretty well and we are on schedule.

This slide gives a brief of the larger areas at work. I spoke about innovation and being a leader.

This is called Nilaya Naturals. This is a super luxury product at the highest point. This is

something which is an organic emulsion packed with 90% organic materials which

are earthsafe with more than 200 shades. It's got a very good vintage matte look and is very popular amongst architect designers and therefore this is our attempt to take on the super luxury space and offer an organic and green product.

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We look at really enhancing décor on the walls in a very strong manner. These are a large set of Italian finishes which we have introduced in the market and is very popular amongst the AID segment. Some of these finishes are very expensive and in the super luxury category, at the top-end of the market.

Some clear innovation products which have strong propositions. We are talking in terms of luxury exterior paint, which comes with a 15+15+15 warranty, which is for durability, for algae and for the waterproofing. We are looking at 'Hydroloc Xtreme', which can be applied on almost 70% damp walls, a technological innovation. And lastly, an 'Anti Insect' paint that keeps common insects away. So, all things which are really world class, including 'Purafin', which is one of the PU finishes looking at the mid-premium segment of wood finishes, which for the first time is coming in this range. So, as I said, every product here is in the premium and the luxury range.

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Shifting from the 'share of surface' to the 'share of space' business, which is our Home Décor. This has been a journey which we have been pursuing over the last few years and we see today we are at about 4% of our decorative revenue. And this is what we are steadily increasing as we are going forward. Today, we have become clearly the number one integrated home player in terms of offering customers décor under one roof through our 44 Beautiful Homes (BH) stores which we have put across geographies in India. And this makes us very strong in terms of catering to the customer, because as we said, Home Décor compliments the

coatings business because you are part of the consumer décor lifecycle.

We have become number two in the fabric and the furnishing business. We have a co-branding arrangement with 'Pure' brand. We have got into areas like wallpaper through collaborations with ace designers like Sabyasachi, Sarita Handa and have also done collaborations with partners like Jaipur Rugs. We introduced the area of lighting and flooring and also the doors and windows with uPVC. We are number one in wall coverings and texture. So, what you see is that literally in terms of most of the categories, you are becoming amongst the top two players in the market, including becoming the number one player in the integrated décor area.

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We already have a Kitchen and Bath business which has been there. The Kitchen business has been doing well. We experienced a growth in the FKD business, but the components business was slow. We had a high price increase base last year and therefore from that point of view, we had a 12% de-growth in terms of our revenue. As far as the PBT is concerned, we improved our margins in the Kitchen business, and we were at about a minus Rs. 2 crores, kind of an overall PBT. As far as Bath is concerned, again Bath was affected by a strong price increase base, and we almost have a breakeven here against a Rs. 4 crores profit which we had last year.

So, I think we were quite affected given the fact that the bases were high because of the price increase. We feel that next quarter would be much better in terms of the two businesses going forward.

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Luxury kitchens, which are being launched under the 'Crest' brand by Sleek, is something in the range of about Rs. 12-15 Lacs per kitchen. Again, a lot of work happening at the luxury end here.

We also have now our 'Nilaya' furniture, which is having European sensibilities with Indian comfort.

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Strong introductions which have been made at our BH stores and are getting very popular.

We have also launched fitted furniture, which consists of vanity units in terms of crockery, entertainment units and so on, so forth. This is a new launch along with the wardrobes in terms of our BH stores. It completes the various areas of aspiration of a consumer.

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As far as the two new acquisitions are concerned - White Teak did extremely well at almost about 28.4% growth. We also had good profitability in terms of PBDIT from this business. We have added more stores, both company owned and franchise owned stores, apart from the fact that the 44 BH stores are selling White Teak. We have acquired another 11% additional stake in June 23, taking our share to about 60% now. So, it has become our subsidiary. As I said earlier, we are number one in terms of decorative lighting here.

As far as we look at Weatherseal, last year we had doubled the sale and this year also we are doing quite well. We have already registered about Rs.9.8 crores of net sales and therefore expanding these businesses. Both the businesses have, done very well in Q1 and we have strong hopes in terms of taking it ahead in terms of what we want to do.

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Some snaps of a new format of Beautiful Homes store, called the Beautiful Homes Studio. This is the next frontier of our journey on home décor. This store has come in Chennai in Anna Nagar and it's about 17,000 square feet. This store is comparable to a store which would be in Paris, London or New York and very high-end luxury. It has really taken

Chennai by storm. It

is really high-end from the point of view offering - decorative lighting, furnishing, furniture and lots of other areas. So, I think this is our journey towards taking the luxury end again, in a strong manner as we go ahead.

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When we look at the International business, it comprises of our operations in Asia, Middle East, Africa largely.

It was a mixed bag in terms of the International business. If we look at the businesses in Middle

East and in Africa, we did quite well, including South Pacific. I think where we were hit was

Asia, largely in the case of Nepal, where there is a little bit of an economic crisis going on.

There's a liquidity crunch and I think that is where we de-grew and this had a quiet of effect

on the overall Asia business, and it also had an effect on the overall global business. In fact,

what we have been seeing is that in some of the markets like Bangladesh, Lanka and Egypt,

there has been devaluation of currency. So, if you were to see this degrowth of 1%, but you

were to convert it into constant currency terms, it comes to about 4% growth. So, in that

sense, I think the overall business is still about 4% positive.

As far as profitability goes, a large part of profitability comes from Nepal. And as I said, the

Nepal market has been down. Overall, we registered lesser profits from last year, but there

was still overall profits of about Rs. 27 crores in this year. PBT levels have dropped down, but

we are hopeful that Asia recovers as we go forward because a lot of business comes from

Nepal, Bangladesh and Lanka in our international foray.

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Going ahead, our Industrial business has been the star business in Q1. Very strong top line

growth coming in. The PPGAP business, which is the business which caters to auto OEM and

refinishes market has done extremely well at about 13% top line growth with

both auto OEM

and refinish segment doing quite well. We have got good realizations in the market from the

point of view of our prices, which we had with our B2B customers. There has been an effect

of the softening of the raw material prices a little bit, which has led to a strong number coming

in terms of PBT. The number is heartening and augurs well for us.

When we look at the other business which is the General Industrial business, which is APPPG,

I think the growth has been consistent. If you look at the last 10 to 12 quarters, it has been

growing in double digits and we delivered almost Rs. 300 crores here with 22% growth. The

profitability numbers were also strong which was aided by the softening of the raw material

prices and a lot of work in terms of improving margins. Both businesses are growing from

strength to strength and this is really adding to the brand in a big way.

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So, if you look at gross margins - we are looking at almost a 9-quarter high. We have seen

deflation in Q4 FY23 and we have seen deflation of about 2% in the current Q1 of FY24. We

see that the overall gross margins have gone up to about 43.4%. And this has been also aided

by a lot of work which we have been doing with respect to the formulation and sourcing

efficiencies. So, this is a strong number as far as the overall gross margins are concerned.

In totality, with respect to the financials at a standalone level, if we look at the top line, it's

about 7% growth led by double-digit almost 10% volume growth. As far as the gross margins

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are concerned, we are almost up by 550 bps. If we were to look the point of view of last year,

same quarter I think very strong 43.4% margin. If we look at PBDIT margins, they have gone

to 24.7% from 19.4% in Q1 last year. And sequentially also, they have gone up by about 170200 bps. So stronger growth happening with respect to margins aided by some softening in

terms of the prices. But this has obviously given a lot of impetus with respect

to PAT numbers  
in terms of what you are seeing on screen.

At a consolidated level, the numbers are not too different. Obviously, top line is more or less close to the standalone number of 7%. Again, gross margins are strong at about 42.8%, a 530 bps improvement. At PBDIT compared to last year Q1 at 23.2 against an 18.1 number and even on a sequential last year quarter, we see a gain of about 190 bps. PAT has been fairly strong in terms of what we have been able to see. There has been a one-time adjustment which we have indicated as a note in the financials. But overall, even if we were to take that one-time kind of benefits out, the growth in terms of both PBDIT as well as the overall numbers has been quite strong.

So, what we are saying overall is we have had a good start as far as FY24 is concerned. Our foray of double-digit volume growth continues, which gives us confidence in terms of our performance. Home Décor, while Kitchen and Bath have been a little bit sluggish, but overall, a plethora of other categories like fabrics, lighting, uPVC, all kind of giving us good growth and  
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we think as a combined business this is something which is galvanizing us and giving us strength with respect to our core business. As I said, it is making us part of the consumer life décor journey. The Industrial business on a clear uptick, giving us double-digit revenue growth and this is a business which has been growing at this rate for the last few quarters and therefore clearly the journey has been strong in terms of what we see going ahead.

International, a little bit less up to our expectations, but I think the forex tightness, the devaluation and so on, so forth are a bit of a challenge, but we still see that if we are able to kind of overcome Asia business, I think it will give us good growth and good profit as we go ahead.

Overall, from the point of view of operational efficiencies, a lot of work is



happening both  
from the point of view of sourcing and formulation and I think this is adding  
to the softening  
of the raw material prices and giving us benefits. So net net, a great start.

On to ESG, I think all of you would have seen our annual report, which has a  
strong component  
of intertwining business with ESG numbers. I think strong progress with respect  
to the three  
areas of Environmental, Social and Governance in terms of what we have taken up  
and I think  
these areas are something which we are steadfastly pursuing within the  
organization.

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If you look whether from the point of view of water replenishment, or with  
respect to energy,  
which is renewable electricity or with respect to the certain areas typical to  
the chemical  
industry in terms of hazardous waste or effluent generation or in terms of  
Scope 1 & 2  
emissions, I think the progress has been very strong. What you see is what we  
have achieved  
in FY23 and then we have looked at two buckets, which is the 2025 bucket which  
you see in  
grey, and the pink bucket, which is the 2030 bucket. So overall it's the  
audacity of the brand  
that we are committing upfront to the ESG framework. On the Social front also,  
a lot of work  
is being done in terms of being water positive and we are getting into a lot of  
areas which  
generate some water in the environment. We are also looking at the area of  
health care  
initiatives and training people from the point of view of making them win  
livelihoods. This is  
a strong area of focus for the organization as we go ahead.

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Lastly, I think all of you would be quite eager in terms of knowing our  
outlook. The Indian  
economy is still pretty good as compared to what we are seeing in terms of the  
world  
economy, whether it is Europe or US or even China and we will continuously push  
for  
aggressive growth. Our growth focus definitely would remain. As I said, the  
rural demand has

been good in Q1 and we see that given the fact that the monsoons today are appearing to be quite good, we would be banking on rural growth going forward.

Raw material prices, while I think they have been going down, we are seeing some increases.

Crude is at an all-time high in terms of what we see., We do not know what trajectory the dollar and the rupee take as we go ahead. So, we are watching the environment and seeing where is the raw material stabilizing, and then we will take a call on our pricing going ahead.

As far as the festive season is concerned, we are looking at it very, very strongly because this time we have a longer season and therefore we think it should be a good season.

Our Home Décor initiatives are strong, and I think they will keep multiplying going ahead and the Industrial business will keep on adding to the overall décor business.

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As I said, I think we are a little bit watchful on the International geographies because unless for us, Nepal and Bangladesh, kick off strongly, I think the Asia business would remain suspect.

But I think we are hoping that they also turn around the corner and it should be good going forward.

So overall, we have a good outlook going forward in terms of how we are looking at the coming quarter and therefore looking at the performance in H2 in a strong way. Thank you so much.

Moderator:

We now begin the Q&A session.

Abneesh Roy (Nuvama):

My first question is when I see your gross margin that is at a 9-quarter high and when I see

other FMCG categories like soaps and detergent, wherein also the gross margin expansion has

happened, local and regional players have come back strongly in terms of either pricing or in

terms of local marketing. So, could you take us through what is happening in the 30% local

market share, which is there. Are you seeing players cutting prices, for example, and are they also starting more of advertising and what is your response to that? Because that's a large market and you are equally aggressive in the lower end of the market.

Amit Syngle:

For us, the bottom of the pyramid is a very strong market, and we look at getting the unorganized customer into the organized brand. Our work emanates in two manners. One is in terms of expanding our footprint so that we are able to reach out to smaller towns. Second, we have a very strong program in terms of below the line marketing initiatives, in terms of what we place in the market. So, whether it is work around influencers, whether it is the work around wooing the consumer, or it is with respect to even the work in terms of looking at brand displays at the shops, I think we do a huge amount of work there too, so a large expenditure possibly goes. Similarly, I think the differential schemes to woo the retailers to stock the material and sell them at a strong incentive to the customers is what we do. So, our concentration has been led by below the line initiatives and topped with a focus on 'Above the line' advertising.

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Going forward, we are looking at giving an impetus to our advertising and looking at these below the line initiatives. What we see very clearly, is the strength of the brand where we are able to command a premium with respect to selling prices and despite the fact that we see some discounting by local players and in some cases also advertising. Today our Q1 results also indicate in that segment we are able to really get good numbers and good response. So, I think net net our initiative of 'Above the line' and 'Below the line' will continue in a strong manner. We would be strong with respect to our initiatives in terms of what we want to put to woo the consumer and we might even look in terms of saying that as we go forward, depending on how the raw material prices fare out, we will look if we need any price corrections.

Shirish Pardeshi (Centrum):

I do understand on a base of 37% volume growth, the volume is about 10% growth. But just

wanted to understand, because you made some remark, that the premium luxury segment is

not to the expectation in the middle and lower end is grown faster. Is this the industry trend

because the local competition has picked up very well and I think there is a pressure and

obviously the demand is high at the lower end. And in that context, I think I do understand

you have prioritised the gross margin and do you think in the medium term we have a pressure

to drop the prices?

Amit Syngle:

There is no middle and lower end premium and luxury. There are only three segments:

economy segment, premium segment and luxury segment. What I said was that the economy

and the premium segments are doing well, and the luxury is a little bit down. If you look at

the market constraint, the economy segment is the biggest segment which is there, followed

by premium and luxury. And therefore, you will have to perform in the economy segment if

you are looking at overall volume and value growth in terms of turning the tables. I think the

premium segment has also done fairly well, riding on wood finishes, riding on adhesives and

riding on enamels.

Overall, we think the premium segment has been strong. I think the decision with respect to

pricing is totally related to how the whole area of raw material prices pan out. We are now

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seeing some resurgence in crude prices, they are at an all-time high in terms of what we see.

Some parts of the raw materials are also going northwards. So, we are watching it carefully

and if the trends are clear, we would look at price correction in that case. Having said that, we

are not seeing local companies, at least in the paint industry, doing very well. Possibly we

would have gained from some of the local competition in terms of the overall

economy  
segment.

Shirish Pardeshi (Centrum):

On the non-decor part, the Industrial business and Home Improvement, The Industrial business has shown momentum. So, in your sense, is it completely normalized because auto OEM and auto refinish business has done exceedingly well, despite the high base. In that context, is there further recovery expected or this is the normalized base and we can build on this. And second, on the Home Improvement, exactly what has gone wrong, because both Sleek and Ess Ess have declined very sharply.

Amit Syngle:

When we look at the Industrial business, I don't think it has reached a place where it cannot grow and we did not have any price increase bases there. I think they were normal bases in terms of what we saw last year. The General Industrial business comprising of Protective paints and Powder coating is something which is on the rise, and I think what we see is that not many industries are coming up. Players are expanding and we see a lot of opportunity in the government infrastructure business, which is also seeing a lot of money getting pumped in. As far as auto is concerned, I think both two-wheeler and four-wheeler, we are seeing strong growth with the additional lines, the whole area of EV coming up and so on and so forth. Both businesses are promising that the uptick should continue in terms of the overall demand as we go ahead.

As far as the overall Home Décor business is concerned, four categories have grown and two categories are down. So, I don't think things are terribly wrong there. In the two businesses, which have degrown a little, we had very high bases because of price increases and that could possibly get corrected as we go ahead in Q2 and Q3.

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As far as the Kitchen F&D business is concerned, we are buoyant because we are

number one

in terms of that FKD business. And even with respect to the Bath business, I think it will

definitely come up going forward. So overall, I think net net, four categories have done well

very clearly in terms of what is there and two categories have gone down.

Overall, Home

Décor, had a fairly good growth.

Shirish Pardeshi (Centrum):

So, you think second half is going to be better as compared to the Q1 weakness?

Amit Syngle:

We think the business would definitely improve because the weakness was coming also

because of a little bit of a base which was very high. So definitely there will be an

improvement.

Avi Mehta (Macquarie):

I just wanted to build on the margin point a little. Basically, are there any one-offs in the other

expenses that we saw this quarter? And the second also related is because you are pointing

towards resurgence of input costs, would you suggest that the current gross margin

performance is something that could be at risk?

Amit Syngle:

If you take the two one-offs which were there, one is in terms of some dividend income which

we got from our industrial JV and the second has been a provision reversal with respect to

sick leave entitlement in terms of the positive change for our employees going forward. I think

if you take out the one-offs, the margin position is still healthy. So, I don't think the one-offs

are really influencing the numbers in a strong manner. And secondly, the overall margin

numbers are also closely governed by how raw material prices pan out in the market. You have

seen that during the whole period of inflation, when the inflation levels had gone to about 20-30% levels, despite taking price increases, the PBDIT margins had gone almost to about 15-16% levels. Today the raw material prices and the environment makes a huge impact with

respect to that. We feel that for the year, our commitment to the overall band of the PBDIT

remaining between 18-20%, should be sacrosanct. That is something which we are committing for the year, and which should remain.

Avi Mehta (Macquarie):

I was just trying to push the bubble by saying that given one does not have a material one time, what we saw almost about 23% margin, that logically one does not see any risk to that continuing and hence there could be possibly an upside risk to your guidance?

Amit Syngle:

You are right as it depends also in terms of if we really look at some changes with respect to

pricing in other areas, then possibly it would, come down and might not remain in this level.

I mean if there is going forward in H2, we see a larger inflation kind of coming back. But I think

we are in a good positive band in terms of what we are looking for the year.

Avi Mehta (Macquarie):

Just a clarification. The festive demand strength should reflect in the next quarter because the

channel gets filled. So, the longer festive period benefit should flow through in the second

quarter. Is that understanding correct?

Amit Syngle:

What happens is that retail season is about at least about 45 days before the festival. So, if

Diwali is in the first week of November or in the first ten days of November, normally what

happens is that the period from 15 September to October end would be a strong retailing

season. We feel that the larger impact would come into Q3, but impact should come into Q2

as well because there is a retailing period which gets impacted by the festive area. So, we

would see that both quarters show an uptick with respect to the long festive season.

Sheela Rathi (Morgan Stanley):

My first question was with respect to the distribution, the dealer network, which we have

added this quarter about 6,000 dealer points and this year we have guided to about 10,000-15,000 dealer points. Just wanted to understand we are looking to

get more into smaller cities.

So here what I wanted to understand is do we have a number in mind in terms of how many

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Asian Paints dealers, a small town could have? And in general, how long does it take for the

dealer to generate the requisite ROI? And has there been any change in terms of the timing

on generating the ROI; because, companies like yours and other competition are also talking

about being more aggressive with respect to adding the dealer points.

Amit Syngle:

What we see is that today the opportunities obviously in terms of the dealer and retail points

is that we keep on looking at not only the smaller towns which are coming up, but we are also

looking at a lot of suburbs of the bigger cities, which are expanding. So, it's a combination of

looking at retail points coming at both these points. What we also feel is that today, it's a

journey in terms of how the retailers start. They might do a certain amount of business in a

year and they kind of keep on growing progressively over the next 3-5 years and therefore the

drop out of a dealer, from the point of view of year one dealing with us to kind of going to

year three, year four is not very high because we look at putting in a tinting mechanism, which

gives them the flexibility of earning more money given the fact that the retailer is able to cater

to a larger range of SKUs which he can offer to the customer.

In our experience, what we feel is that this is a kind of journey which will continue given the

vastness of our country and given the opportunities of now the larger road network,

government infrastructure, the way it is developing. I think the opportunities are fairly huge.

For example, if you look at the entire J&K portion today and the opportunities that have

opened are very big. Similarly, look at North East, given the connectivity of roads which is

coming. So, I think these areas of expansion are going to continue and we feel that right from

year one onwards, people get their ROI because at Asian Paints, we offer them a very, very



high rotation of inventory and they keep on growing as the years go by. Some 5% of the retail network might drop out because of some liquidity crunch or some other personal problems which might come in. But overall, I think the business model is pretty strong.

Sheela Rathi (Morgan Stanley):

And we have not seen any change in terms of the pattern it was say three years ago in terms of, you know the competitive intensity among the dealers.

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Amit Syngle:

No, I don't think so, because the expansion really continues only because of the fact that, overall connectivity, the whole economic activity is only increasing. I think the consumption is also going higher given housing, which is coming, and I think we will not see any change in this for the next 5-10 years.

Rishi Mody (Marcellus):

My first question is we have seen the Kitchen and Bath business kind of struggle to scale up immensely. If you could take us through the journey, what have been the challenges? What are the bottlenecks today. How are we solving it and where are we in the journey before we can push the pedal on the gas to scale this up massively?

Amit Syngle:

When you look at the last three years of journey, first year in Kitchen and Bath, we grew almost about 35%. Second year again, we would have grown at about 30-35%. Last year we grew almost about 10-15%. So last year was a bit slow and this year in the first quarter, we are seeing to some extent the business slowing down because of the large base.

So, I would not say that the business has not grown. I think last three years, the combined business of the two entities is close to about Rs. 830 crores. Therefore, this business has grown from about Rs. 500 crores to about Rs. 830 crores, and I think that's a good increase, which we have seen in the last three years.

As we go ahead, we should be able to add good overall growth. Kitchen also has a hardware business to it, which is called the components business, which also contributes to about 40% of the total Kitchen plus components business. This is the business that just kind of slowed down in the market because of certain price changes we implemented. And also, as I said, that these price changes were done in the last year, first quarter. So overall, I think for both categories, we are still fairly buoyant in terms of what we see and more buoyant towards Kitchen because it is in sync with our strategy on Home Décor, when we look at our Beautiful Homes stores. 44 stores today across the country, and these stores are going to about 65-70 stores this year.

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And therefore, we feel that these stores will also give an impetus to both categories, along with the projects B2B business. Overall, we still see that these two businesses from a trajectory are going to be strong because the opportunity is huge.

Rishi Mody (Marcellus):  
So just wanted to get the clarification. You are happy with 30% growth rate for this Kitchen and Bath business? You don't have aspirations for doubling of business year on year. Like, if you have those aspirations, what are the bottlenecks for doubling or multi fold growth in this category?

Amit Syngle:  
Happiness is a relative state of mind. I might be happy with tripling business also going forward, but you need to be practical in terms of the way you want to grow and not really strain the system. We have just put additional capacity for both the Kitchen and the Bath which has come up in Maharashtra so that we are able to really put a strong impetus. Going forward, we are happy if we are able to grow the business by about 25-30% each year. That's a fairly healthy rate in terms of growth. In terms of what we see. I think the idea here is that you look at strong consumer propositions and you look at possibly equipping

your stores in  
terms of really carving a niche for yourself. So, I think we are taking really  
measured calls in  
terms of the way we want to kind of go. And as I said, I think we should be  
happy in terms of  
getting about 25-30% growth in this segment, which should be a good indicator  
in terms of  
our overall growth. We have always said that going forward, the whole Home  
Décor segment  
should be closer to about 7-8% of our decorative sales as we look at FY26. So,  
at the end of  
FY26, that's the number we are gunning for. And I think that would be a strong  
number if we  
are able to reach that.

Rishi Mody (Marcellus):  
Secondly, there have been a bit of a changes at the Board level. We have a new  
Chairman and  
we also have a new member joining the board. So just wanted to get your  
understanding on  
what are both of these guys bringing to the respective roles, that they've been  
assigned? How  
are you viewing this appointment?

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Amit Syngle:  
This is in regular course. We have Mr. Deepak Satwalekar, who was the Chairman.  
His term  
comes to an end in September end and therefore we had to announce the new  
Chairman and  
we have Mr. R. Seshasayee who takes the Chair. He comes with a rich background  
in terms of  
heading Ashok Leyland earlier and being at the helm of lot many other  
companies, including  
Infosys. He comes with a very strong area of expertise and I think has been a  
strong directional  
leader at Asian Paints in terms of his contribution to the Board. So, I think  
that's the kind of  
transition in terms of what we are seeing, which is a natural transition and a  
strong one too.

Second is that we have one of our Directors who we had completed his term, Dr.  
S Sivaram,  
and in place of him, we are taking Mrs. Ireena Vittal. She comes in again with  
strong  
experience. She has been with HDFC and other boards like Wipro. She brings in a  
strong area

of capital to really energize us from the point of view of our thought with respect to newer businesses, technologies and also with respect to the overall financial kind of management.

So, I think that's the thought in terms of looking at these two people.

Rishi Mody (Marcellus):

Alright, and finally, just a bookkeeping question. When we say NPD contribution, is 11% of sales, how do you define the NPD? Like, what period of launch were these products launched within?

Amit Syngle:

So normally it takes us almost about 1-2 years to kind of launch the product and then sustain it. So, we normally define it as NPD over 3 years. So that's how a new product is defined.

Amit Rustagi (UBS):

I have a question relating to margins. If you look at the Q1 margins, they were pretty strong vs. of a guided range of 18-20%. So, what do you think is the best utilization of margin from here? Would it be more channel discounting or reinvestment? Or you think the price cuts? So, what do you think is the status quo. What do you like to achieve from the excess margins you have?

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Amit Syngle:

We don't really act on quarter to quarter in terms of the margins you get, because you have seen the last two years, given the inflation, I think the margins had gone even lower than that band. We take a considered view in terms of how the margins are emanating and whether they are stable from a point of view of overall business and environment. We would obviously be aggressive with respect to our 'Above the line' and 'Below the line' programs. In terms of what we do in marketing and our share of voice in the market, our media spends and our other marketing activities, including, various measures on really exciting the market through various schemes and discounting mechanisms. I think that is first and foremost

because we

are committing ourselves to growth and we will not let that growth go away. And we are pretty aggressive about that in terms of our thought.

Overall, as we go ahead, depending on how the raw material prices pan out, how the rupee

dollar parity pans out, we might look at even pricing corrections. But I think we will really be

watchful in terms of seeing what is there and just not react quarter to quarter. I think we take

a considered call in terms of going forward. And that is something which possibly is the right

mechanism, as we see from the Asian Paints point of view.

Amit Rustagi (UBS):

My second question is, if we have to resort to a price pass to the consumers, we have seen in

some of the consumer companies, the channel inventories get impacted and the channel

inventory comes down impacting the primary sales. What do you think in our case, how the

price cuts will be implemented and how would the channel react to those price cuts?

Amit Syngle:

So as far as Asian Paints is concerned, I think we don't depend on channel inventories a lot

because our channel inventories are to a minimum level because of the fact that we are able

to service the retailer at least almost about two times in a day. And therefore, I think we don't

really encourage too much loading the retailer in terms of inventories. However, in some

months, if there are stocking months and if there is any price corrections, we are willing to

give concession to the retailer in terms of a back linkage, which happens on certain stocks. I

think it is something which goes in conjunction in terms of really seeing that both the

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organization, the brand and the retailer, all benefit from what we are doing. So, I think the

considered call is very clearly that we take them along with us so that even if they have stocked

for some time, they should not be at a loss in terms of that stocking.

Moderator:

Thank you so much for all your questions. Requesting Mr. Amit Syngle to please give his closing remarks.

Amit Syngle:

It was good hearing questions coming from your side. It's been a good quarter. I think we are fairly satisfied with respect to the kind of overall numbers which have come in. We are looking forward to the long, festive season. And we feel that today the Indian story is still live in terms of the overall demand conditions. Good monsoons coming is also a positive indicator. The coming period should be a good one, as far as overall business goes. Thank you so much for coming and being with us today.

###

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```
[ ]: message = [{"role" : "user", "content" : prompt}]

chat_repsonse = openai.chat.completions.create(
    model = "gpt-3.5-turbo-16k",
    messages = message,
    max_tokens = 150,
    temperature = 0.5,
    n = 1,
    stop = None,
    frequency_penalty= 0,
    presence_penalty = 0
)

print(chat_repsonse.choices[0].message.content)
```

Based on the transcript, Asian Paints' business has grown by 10% in terms of volume and 8% in terms of value compared to the previous year. This growth is considered strong, especially considering the high base from the previous year's growth of 59% in value. The company has also seen consistent growth over the past 12 quarters, with a 4-year CAGR in the range of 15-20%.

```
[ ]: question = "Summarise the key financial metrics reported in the transcript,
↳related to revenue growth, profitability, cash flow and debt"

prompt = f"{base_instruction}\n\nQuestion: {question}\n\nTranscript:
↳\n{transcript}"

message = [{"role": "user", "content": prompt}]

chat_response = openai.chat.completions.create(
    model = "gpt-3.5-turbo-16k",
    messages = message,
    max_tokens = 500,
    temperature = 0.5,
    n = 1,
    stop = None,
    frequency_penalty = 0,
    presence_penalty = 0
)

print(chat_response.choices[0].message.content)
```

Key Financial Metrics reported in the transcript related to revenue growth, profitability, cash flow, and debt:

1. Revenue Growth: Asian Paints reported a strong quarter in terms of overall volume growth, with a double-digit 10% volume growth. Over a four-year period, the company achieved a strong double-digit 17.5% CAGR in volume growth. The value number was also relatively strong at about 8%.
2. Profitability: The company reported strong gross margins at a 9-quarter high of 43.4%. The PBDIT margins improved to 24.7% from 19.4% in the same quarter last year. The company saw strong profitability in its PPGAP business, which recorded a 13% top-line growth, and its General Industrial business, which achieved 22% growth.
3. Cash Flow: The transcript did not provide specific information about cash flow.
4. Debt: The transcript did not provide specific information about debt.

```
[ ]: message = [{"role" : "system", "content": "You are an amazing AI teaching
↳assistant that assists school students with maths home work problems"},
    {"role": "user", "content" : "Help me solve the equation 2x - 10 =
↳20" },
```

```

        {"role" : "system", "content": "Try moving -10 which was on the_
↳left side of the equation to the right side, so that the sign changes and_
↳consequently it adds to existing number '20' on the right side to become a_
↳total of '30'"},
        {"role": "user", "content": "2x = 30"},
        {"role": "system", "content": "Good job, now try to move the '2'_
↳which was on the left side to right side, thus consequently 2 gets divided_
↳by 30, as '2' is in multiplicative state with x on the left side. "},
        {"role": "user", "content": "x = 30/2"},
        {"role": "system", "content": "Great, Now find out the answer for_
↳the division on the right side to get the value of x in the equation"},
        {"role": "user", "content" : "x = 10"},
        {"role" : "system", "content" : "Wonderful, you did a greate job_
↳solving the equation. Still If you have any more queries feel freee to ask"},
        {"role" : "user", "content" : "Help me to solve the following_
↳equation 3x - 15 = 50"}]]

chat_response = openai.chat.completions.create(
    model = "gpt-3.5-turbo-16k",
    messages = message
)

print(chat_response.choices[0].message.content)

```

To solve the equation  $3x - 15 = 50$ , we will follow similar steps as before.

First, let's move -15 to the right side of the equation by adding 15 to both sides:

$$3x - 15 + 15 = 50 + 15$$

This simplifies to:

$$3x = 65$$

Next, divide both sides of the equation by 3 to solve for x:

$$3x/3 = 65/3$$

Simplifying further:

$$x = 65/3$$

So, the solution to the equation  $3x - 15 = 50$  is  $x = 65/3$ .



```

[ ]: max_conversations = 20
conversation_length = 0

token_count = {'prompt_tokens' : 0,
               'completion_tokens' : 0,
               'total_tokens' : 0}

message = [{"role" : "system", "content": "You are an amazing AI teaching assistant that assists school students with maths home work problems"},
            {"role": "system", "name": "example_user", "content" : "Help me solve the equation  $2x - 10 = 20$ " },
            {"role" : "system", "name": "example_assistant", "content": "Try moving -10 which was on the left side of the equation to the right side, so that the sign changes and consequently it adds to existing number '20' on the right side to become a total of '30'"},
            {"role": "system", "name": "example_user", "content": "2x = 30"},
            {"role": "system", "name": "example_assistant", "content": "Good job, now try to move the '2' which was on the left side to right side, thus consequently 2 gets divided by 30, as '2' is in multiplicative state with x on the left side. "},
            {"role": "system", "name": "example_user", "content": "x = 30/2"},
            {"role": "system", "name": "example_assistant", "content": "Great, Now find out the answer for the division on the right side to get the value of x in the equation"},
            {"role": "system", "name": "example_user", "content" : "x = 10"},
            {"role" : "system", "name": "example_assistant", "content" : "Wonderful, you did a greate job solving the equation. Still If you have any more queries feel freee to ask"}]

while conversation_length <= max_conversations:
    user_input = input()

    if "exit" in user_input.lower():
        print("AI Tutor, Exiting the conversation!")
        break

    message.append({"role" : "user", "content" : user_input})

    chat_response = openai.chat.completions.create(
        model = "gpt-3.5-turbo-16k",
        messages = message
    )

    response = chat_response.choices[0].message.content

    token_count['prompt_tokens'] += chat_response.usage.prompt_tokens
    token_count['completion_tokens'] += chat_response.usage.completion_tokens

```

```

token_count['total_tokens'] += chat_response.usage.total_tokens

print("\n", "AI Tutor:")
print(response)
print("\n")

message.append({"role": "assistant", "content": response})
conversation_length += 1

print(token_count)

```

help me to solve  $3x - 15 = 80$

AI Tutor:  
Sure! Let's solve the equation step by step.

First, let's move the constant term (-15) to the right side of the equation, so it changes its sign:

$$3x = 80 + 15$$

Simplifying the right side:

$$3x = 95$$

Now, let's isolate x by dividing both sides of the equation by 3:

$$x = 95/3$$

To get the decimal value, you can divide 95 by 3:

$$x \approx 31.67$$

So, the solution to the equation  $3x - 15 = 80$  is  $x \approx 31.67$ .

help me to solve  $2x + 25 = 11$

AI Tutor:  
Certainly! Let's solve the equation step by step.

First, let's move the constant term (+25) to the right side of the equation, so it changes its sign:

$$2x = 11 - 25$$

Simplifying the right side:

$$2x = -14$$

Now, let's isolate  $x$  by dividing both sides of the equation by 2:

$$x = -14/2$$

Simplifying the division:

$$x = -7$$

So, the solution to the equation  $2x + 25 = 11$  is  $x = -7$ .

exit

AI Tutor, Exiting the conversation!

{'prompt\_tokens': 691, 'completion\_tokens': 245, 'total\_tokens': 936}

```
[ ]: ! pip install tenacity
```

Requirement already satisfied: tenacity in /usr/local/lib/python3.10/dist-packages (8.4.2)

```
[ ]: from tenacity import retry, wait_random_exponential, stop_after_attempt
```

```
[ ]: @retry(wait = wait_random_exponential(min = 1, max = 20), stop =
    ↳stop_after_attempt(6))
def get_response(user_prompt):
    MODEL = 'gpt-3.5-turbo-16k'

    message = [{"role" : "user", "content" : user_prompt}]

    chat_response = openai.chat.completions.create(
        model = MODEL,
        messages = message
    )

    return chat_response.choices[0].message.content
```

```
[ ]: import pandas as pd
import numpy as np
df = pd.read_csv("laptop_descriptions.csv")
df.head()
```

```
[ ]:                                laptop_description
0  The Dell Inspiron is a versatile laptop that c...
```

- 1 The MSI GL65 is a high-performance laptop desi...
- 2 The HP EliteBook is a premium laptop designed ...
- 3 The Lenovo IdeaPad is a versatile laptop that ...
- 4 The ASUS ZenBook Pro is a high-end laptop that...

```
[ ]: mcq1_prompt = '''From the description of a laptop (delimited by '###'), you
    ↪have to identify what role
does the laptop serve. Refer to the key value pairs of categories and category
    ↪details below. Identify
which of the following details does the product description fits best and
    ↪assign that category to that laptop. \n
Categories:
[
    'general': 'For general purpose use such as light web browsing, editing
    ↪documents etc.'
    'business': 'For business users, the focus is on portability, battery
    ↪backup and general purpose use.'
    'gamer': 'For gamers, the focus is primarily on high-performance, high-end
    ↪graphics requirement, efficient processor etc.'
    'programmer': 'For programmers, the focus is on performance, battery
    ↪backup, high-end RAM etc.'
    'multimedia': 'For multimedia use cases, the requirements are a good
    ↪quality/ high resolution display,
        wide screens, good audio and video quality, battery backup, efficiency etc.
    ↪' # Write the prompt here
] \n
Laptop description: {description}
'''
```

```
[ ]: def get_chat_response_mcq1(user_request):

    '''
    This function ONLY takes `user_request` as the input argument.
    As you can see, the System Prompt is given inside the function itself so we
    ↪don't require to give it as an input argument
    '''

    model = 'gpt-3.5-turbo-16k'

    system_message = '''You are a shopping assistant.
    The user will give you laptop description and some categories and their
    ↪details.
    You have to find out which of the categories does the laptop fit best
    ↪according to description.
    Remember to only give one word output, the category name,
    from the list of categories only, which resembles most closely.'''
```

```

try:

    message = [{"role" : "system", "content" : system_message},
                {"role" : "user", "content" : user_request}]

    chat_response = openai.chat.completions.create(
        model = model,
        messages = message
    )

    response = chat_response.choices[0].message.content

    return response

except Exception as e:
    print(f"An error occurred: {e}")
    return None

```

```
[ ]: a = df.copy()
```

```

[ ]: def tag_laptop():

    laptop_df = df.copy()
    laptop_dict = laptop_df.to_dict(orient = 'records')

    for i in range(len(laptop_dict)):
        prompt = mcq1_prompt.format(description =
↳laptop_dict[i]['laptop_description'])
        laptop_catgeory = get_chat_response_mcq1(prompt)
        laptop_df.at[i, 'Category'] = laptop_catgeory

    return laptop_df

```

```
[ ]: tag_df = tag_laptop()
```

```
[ ]: tag_df.head(5)
```

```

[ ]:

```

	laptop_description	Category
0	The Dell Inspiron is a versatile laptop that c...	multimedia
1	The MSI GL65 is a high-performance laptop desi...	gamer
2	The HP EliteBook is a premium laptop designed ...	business
3	The Lenovo IdeaPad is a versatile laptop that ...	multimedia
4	The ASUS ZenBook Pro is a high-end laptop that...	multimedia

```
[ ]: structure = '''{
    "Brand": _____,
    "Model_name": _____,
    "GPU Processor": _____,
    "Display Resolution" : _____,
    "Weight" : _____,
    "Processor" : _____,
    "Clock Speed": _____,
    "Budget": _____
}'''
```

```
[ ]: mcq2_prompt = '''
Laptop Decription: {description}
From the laptop decription above, you have to extract relevant values for the
↳following dictionary items.
The dictionary structure should be as follows: {str} Try giving quantitative,
↳absolute, or numerical outputs.
Try not to give qualitative or adjective outputs. for example: If the
↳processing speed of a laptop is 2.4GHz,
then, in the "processing speed" key, give output as '2.4GHz' instead of 'very
↳fast'.
Extract only one word values of these properties. Fill in the blanks for each
↳product and
output each product's dictionary in json format.
'''
```

```
[ ]: def get_chat_response_mcq2(user_request):

    '''
    This function ONLY takes `user_request` as the input argument.
    As you can see, the System Prompt is given inside the function itself so we
    ↳don't require to give it as an input argument
    '''

    model = 'gpt-3.5-turbo-16k'

    system_message = '''You are a very helpful shopping assistant.'''

    try:

        message = [{"role" : "system", "content" : system_message},
                    {"role" : "user", "content" : user_request}]

        chat_response = openai.chat.completions.create(
            model = model,
            messages = message
        )
```

```

    response = chat_response.choices[0].message.content

    return response

except Exception as e:
    print(f"An error occurred: {e}")
    return None

```

```

[ ]: def extract_information():

    laptop_df = df.copy()
    laptop_dict = laptop_df.to_dict(orient = 'records')

    result = []

    for i in range(len(laptop_dict)):
        prompt = mcq2_prompt.format(description = _
↳laptop_dict[i]['laptop_description'], str = structure)
        values = get_chat_response_mcq2(prompt)
        result.append(values)
        print(result[i])

    return result

```

```

[ ]: values = extract_information()

```

```

{
  "Brand": "Dell",
  "Model_name": "Inspiron",
  "GPU Processor": "Intel",
  "Display Resolution" : "1920x1080",
  "Weight" : "2.5kg",
  "Processor" : "Core",
  "Clock Speed": "2.4GHz",
  "Budget": "35,000"
}
{
  "Brand": "MSI",
  "Model_name": "GL65",
  "GPU Processor": "NVIDIA",
  "Display Resolution": "1920x1080",
  "Weight": "2.3 kg",
  "Processor": "Intel",
  "Clock Speed": "2.6 GHz",
  "Budget": "55,000"
}

```

```

{
  "Brand": "HP",
  "Model_name": "EliteBook",
  "GPU Processor": "Intel UHD",
  "Display Resolution" : "1920x1080",
  "Weight" : "1.5 kg",
  "Processor" : "Intel",
  "Clock Speed": "2.8 GHz",
  "Budget": "90,000"
}
{
  "Brand": "Lenovo",
  "Model_name": "IdeaPad",
  "GPU Processor": "Intel UHD",
  "Display Resolution" : "1366x768",
  "Weight" : "2.2 kg",
  "Processor" : "Intel Core i3",
  "Clock Speed": "2.1 GHz",
  "Budget": "25,000"
}
{
  "Brand": "ASUS",
  "Model_name": "ZenBook Pro",
  "GPU Processor": "NVIDIA",
  "Display Resolution" : "3840x2160",
  "Weight" : "1.8 kg",
  "Processor" : "Intel",
  "Clock Speed": "3.1 GHz",
  "Budget": "200,000"
}
{
  "Brand": "Acer",
  "Model_name": "Predator",
  "GPU Processor": "NVIDIA",
  "Display Resolution" : "1920x1080",
  "Weight" : "3.2kg",
  "Processor" : "Intel",
  "Clock Speed": "2.8GHz",
  "Budget": "80000"
}
{
  "Brand": "Microsoft",
  "Model_name": "Surface",
  "GPU Processor": "Intel Iris Plus",
  "Display Resolution" : "2256x1504",
  "Weight" : "1.3 kg",
  "Processor" : "Intel",
  "Clock Speed": "1.6 GHz",

```



```

    "Budget": "90,000"
  }
  {
    "Brand": "Lenovo",
    "Model_name": "ThinkPad",
    "GPU Processor": "NVIDIA",
    "Display Resolution" : "2560x1440",
    "Weight" : "1.6kg",
    "Processor" : "Ryzen",
    "Clock Speed": "3.0GHz",
    "Budget": "60,000"
  }
  {
    "Brand": "HP",
    "Model_name": "Pavilion",
    "GPU Processor": "Intel UHD",
    "Display Resolution" : "1366x768",
    "Weight" : "2.1 kg",
    "Processor" : "Intel Core i5",
    "Clock Speed": "2.3 GHz",
    "Budget": "30,000"
  }
  {
    "Brand": "ASUS",
    "Model_name": "ROG Strix G",
    "GPU Processor": "NVIDIA RTX",
    "Display Resolution": "1920x1080",
    "Weight": "2.9 kg",
    "Processor": "Intel",
    "Clock Speed": "2.9 GHz",
    "Budget": "85,000"
  }
  {
    "Brand": "Dell",
    "Model_name": "XPS 15",
    "GPU Processor": "NVIDIA",
    "Display Resolution" : "3840x2160",
    "Weight" : "1.8kg",
    "Processor" : "Intel",
    "Clock Speed": "2.8GHz",
    "Budget": "180000"
  }
  {
    "Brand": "Lenovo",
    "Model_name": "ThinkPad X1 Carbon",
    "GPU Processor": "Intel UHD",
    "Display Resolution" : "2560x1440",
    "Weight" : "1.13 kg",

```

```

    "Processor" : "Intel Core i7",
    "Clock Speed": "2.6 GHz",
    "Budget": "130,000"
  }
  {
    "Brand": "Acer",
    "Model_name": "Swift 3",
    "GPU Processor": "Radeon",
    "Display Resolution" : "1920x1080",
    "Weight" : "1.2kg",
    "Processor" : "Ryzen",
    "Clock Speed": "2.3GHz",
    "Budget": "50000"
  }
  {
    "Brand": "Apple",
    "Model_name": "MacBook Air",
    "GPU Processor": "Apple M1",
    "Display Resolution" : "2560x1600",
    "Weight" : "1.29 kg",
    "Processor" : "Apple M1",
    "Clock Speed": "3.2 GHz",
    "Budget": "100000"
  }
  {
    "Brand": "MSI",
    "Model_name": "Prestige 14",
    "GPU Processor": "NVIDIA GTX",
    "Display Resolution" : "1920x1080",
    "Weight" : "1.29 kg",
    "Processor" : "Intel Core i5",
    "Clock Speed": "2.4 GHz",
    "Budget": "70,000"
  }
  {
    "Brand": "ASUS",
    "Model_name": "ZenBook 13",
    "GPU Processor": "Intel Iris Xe",
    "Display Resolution": "1920x1080",
    "Weight": "1.11 kg",
    "Processor": "Intel Core i7",
    "Clock Speed": "2.8 GHz",
    "Budget": "95,000"
  }
  {
    "Brand": "Dell",
    "Model_name": "Precision 5550",
    "GPU Processor": "NVIDIA Quadro",

```

```

    "Display Resolution" : "3840x2160",
    "Weight" : "1.83 kg",
    "Processor" : "Intel Xeon",
    "Clock Speed": "2.6 GHz",
    "Budget": "250000"
}
{
    "Brand": "HP",
    "Model_name": "ENVY x360",
    "GPU Processor": "Intel Iris Xe",
    "Display Resolution": "1920x1080",
    "Weight": "2.05 kg",
    "Processor": "Intel Core i7",
    "Clock Speed": "2.8 GHz",
    "Budget": "80,000"
}
{
    "Brand": "Razer",
    "Model_name": "Blade 15",
    "GPU Processor": "NVIDIA",
    "Display Resolution" : "1920x1080",
    "Weight" : "2.09 kg",
    "Processor" : "Intel",
    "Clock Speed": "2.6 GHz",
    "Budget": "150000"
}
{
    "Brand": "Apple",
    "Model_name": "MacBook Pro",
    "GPU Processor": "AMD Radeon",
    "Display Resolution": "3072x1920",
    "Weight": "2.02 kg",
    "Processor": "Intel Core i9",
    "Clock Speed": "2.9 GHz",
    "Budget": "280000"
}

```

```
[ ]: !pip install -q -U wikipedia-api
```

```
[ ]: import wikipediaapi
```

```
[ ]: def wiki_search(query_term):

    string = "SearchQuery"

    wiki_wiki = wikipediaapi.Wikipedia(user_agent = string, language = 'en')
    page = wiki_wiki.page(query_term)
```

```
content = page.text
return content
```

```
[ ]: def get_wiki_query(user_request):

    model = "gpt-3.5-turbo-16k"

    system_message = '''
    The user will ask you a question. Your task is to extract the main topic name
    about which the user wants to know.
    You have to give relevant output of just the main topic of the questions.
    For example, if the user asks for "height of Narendra Modi", you have to give
    the answer as 'Narendra Modi'.
    If the user asks for "When was Eiffel tower built?", you have to give output
    as 'Eiffel Tower'.
    Similarly, whatever the user asks, you have to extract the main point of the
    question as a context and give
    out that as answer, do not add the other attributes about the topic asked in
    the question.
    If this doesn't work, extract the closest matching search query that will be
    able to give the required
    information from wikipedia. for example, if the user asks "Where is the next
    FIFA world cup", give the output as 'FIFA World Cup'.
    '''

    try:

        message = [{"role" : "system", "content" : system_message},
                    {"role" : "user", "content" : user_request}]

        chat_response = openai.chat.completions.create(
            model = model,
            messages = message
        )

        response = chat_response.choices[0].message.content

        return response

    except Exception as e:
        print(f"An error has occurred: {e}")
        return None
```

```
[ ]: user_request = '''
current president of india'''
```

```
[ ]: query_term = get_wiki_query(user_request)
```

```
[ ]: context = wiki_search(query_term)
```

```
[ ]: print(context)
```

India, officially the Republic of India (ISO: Bhārat Gaṇarājya), is a country in South Asia. It is the seventh-largest country by area; the most populous country as of June 2023; and from the time of its independence in 1947, the world's most populous democracy. Bounded by the Indian Ocean on the south, the Arabian Sea on the southwest, and the Bay of Bengal on the southeast, it shares land borders with Pakistan to the west; China, Nepal, and Bhutan to the north; and Bangladesh and Myanmar to the east. In the Indian Ocean, India is in the vicinity of Sri Lanka and the Maldives; its Andaman and Nicobar Islands share a maritime border with Thailand, Myanmar, and Indonesia.

Modern humans arrived on the Indian subcontinent from Africa no later than 55,000 years ago.

Their long occupation, initially in varying forms of isolation as hunter-gatherers, has made the region highly diverse, second only to Africa in human genetic diversity. Settled life emerged on the subcontinent in the western margins of the Indus river basin 9,000 years ago, evolving gradually into the Indus Valley Civilisation of the third millennium BCE.

By 1200 BCE, an archaic form of Sanskrit, an Indo-European language, had diffused into India from the northwest. Its evidence today is found in the hymns of the Rigveda. Preserved by an oral tradition that was resolutely vigilant, the Rigveda records the dawning of Hinduism in India. The Dravidian languages of India were supplanted in the northern and western regions.

By 400 BCE, stratification and exclusion by caste had emerged within Hinduism, and Buddhism and Jainism had arisen, proclaiming social orders unlinked to heredity.

Early political consolidations gave rise to the loose-knit Maurya and Gupta Empires based in the Ganges Basin.

Their collective era was suffused with wide-ranging creativity, but also marked by the declining status of women, and the incorporation of untouchability into an organised system of belief. In South India, the Middle kingdoms exported Dravidian-languages scripts and religious cultures to the kingdoms of Southeast Asia.

In the early medieval era, Christianity, Islam, Judaism, and Zoroastrianism became established on India's southern and western coasts.

Muslim armies from Central Asia intermittently overran India's northern plains, eventually founding the Delhi Sultanate, and drawing northern India into the cosmopolitan networks of medieval Islam.

In the 15th century, the Vijayanagara Empire created a long-lasting composite Hindu culture in south India.

In the Punjab, Sikhism emerged, rejecting institutionalised religion.

The Mughal Empire, in 1526, ushered in two centuries of relative peace, leaving a legacy of luminous architecture.

Gradually expanding rule of the British East India Company followed, turning India into a colonial economy, but also consolidating its sovereignty. British Crown rule began in 1858. The rights promised to Indians were granted slowly, but technological changes were introduced, and modern ideas of education and the public life took root. A pioneering and influential nationalist movement emerged, which was noted for nonviolent resistance and became the major factor in ending British rule. In 1947 the British Indian Empire was partitioned into two independent dominions, a Hindu-majority Dominion of India and a Muslim-majority Dominion of Pakistan, amid large-scale loss of life and an unprecedented migration.

India has been a federal republic since 1950, governed through a democratic parliamentary system. It is a pluralistic, multilingual and multi-ethnic society. India's population grew from 361 million in 1951 to almost 1.4 billion in 2022.

During the same time, its nominal per capita income increased from US\$64 annually to US\$2,601, and its literacy rate from 16.6% to 74%. From being a comparatively destitute country in 1951, India has become a fast-growing major economy and a hub for information technology services, with an expanding middle class. India has a space programme with several planned or completed extraterrestrial missions. Indian movies, music, and spiritual teachings play an increasing role in global culture. India has substantially reduced its rate of poverty, though at the cost of increasing economic inequality. India is a nuclear-weapon state, which ranks high in military expenditure. It has disputes over Kashmir with its neighbours, Pakistan and China, unresolved since the mid-20th century. Among the socio-economic challenges India faces are gender inequality, child malnutrition, and rising levels of air pollution. India's land is megadiverse, with four biodiversity hotspots. Its forest cover comprises 21.7% of its area. India's wildlife, which has traditionally been viewed with tolerance in India's culture, is supported among these forests, and elsewhere, in protected habitats.

### Etymology

According to the Oxford English Dictionary (third edition 2009), the name "India" is derived from the Classical Latin *India*, a reference to South Asia and an uncertain region to its east. In turn the name "India" derived successively from Hellenistic Greek *India* ( *Ἰνδία* ), ancient Greek *Indos* ( *Ἰνδός* ), Old Persian *Hindush* (an eastern province of the Achaemenid Empire), and ultimately its cognate, the Sanskrit *Sindhu*, or "river", specifically the Indus River and, by implication, its well-settled southern basin. The ancient Greeks referred to the Indians as *Indoi* ( *Ἰνδοί* ), which translates as "The people of the Indus".

The term *Bharat* (*Bhārat*; pronounced [bʱaːɐ̯t̪] ), mentioned in both Indian epic poetry and the Constitution of India, is used in its variations by many Indian languages. A modern rendering of the historical name *Bharatavarsha*, which applied originally to North India, *Bharat* gained increased currency from the mid-19th century as a native name for India.

*Hindustan* ([ *ɦɪnd̪ˈstaːn* ] ) is a Middle Persian name for India that became popular by the 13th century, and was used widely since the era of the Mughal Empire. The meaning of *Hindustan* has varied, referring to a region encompassing

present-day northern India and Pakistan or to India in its near entirety.

## History

### Ancient India

By 55,000 years ago, the first modern humans, or *Homo sapiens*, had arrived on the Indian subcontinent from Africa, where they had earlier evolved. The earliest known modern human remains in South Asia date to about 30,000 years ago. After 6500 BCE, evidence for domestication of food crops and animals, construction of permanent structures, and storage of agricultural surplus appeared in Mehrgarh and other sites in Balochistan, Pakistan. These gradually developed into the Indus Valley Civilisation, the first urban culture in South Asia, which flourished during 2500-1900 BCE in Pakistan and western India. Centred around cities such as Mohenjo-daro, Harappa, Dholavira, and Kalibangan, and relying on varied forms of subsistence, the civilisation engaged robustly in crafts production and wide-ranging trade.

During the period 2000-500 BCE, many regions of the subcontinent transitioned from the Chalcolithic cultures to the Iron Age ones. The Vedas, the oldest scriptures associated with Hinduism, were composed during this period, and historians have analysed these to posit a Vedic culture in the Punjab region and the upper Gangetic Plain. Most historians also consider this period to have encompassed several waves of Indo-Aryan migration into the subcontinent from the north-west. The caste system, which created a hierarchy of priests, warriors, and free peasants, but which excluded indigenous peoples by labelling their occupations impure, arose during this period. On the Deccan Plateau, archaeological evidence from this period suggests the existence of a chiefdom stage of political organisation. In South India, a progression to sedentary life is indicated by the large number of megalithic monuments dating from this period, as well as by nearby traces of agriculture, irrigation tanks, and craft traditions.

In the late Vedic period, around the 6th century BCE, the small states and chiefdoms of the Ganges Plain and the north-western regions had consolidated into 16 major oligarchies and monarchies that were known as the mahajanapadas. The emerging urbanisation gave rise to non-Vedic religious movements, two of which became independent religions. Jainism came into prominence during the life of its exemplar, Mahavira. Buddhism, based on the teachings of Gautama Buddha, attracted followers from all social classes excepting the middle class; chronicling the life of the Buddha was central to the beginnings of recorded history in India. In an age of increasing urban wealth, both religions held up renunciation as an ideal, and both established long-lasting monastic traditions. Politically, by the 3rd century BCE, the kingdom of Magadha had annexed or reduced other states to emerge as the Mauryan Empire. The empire was once thought to have controlled most of the subcontinent except the far south, but its core regions are now thought to have been separated by large autonomous areas. The Mauryan kings are known as much for their empire-building and determined management of public life as for Ashoka's renunciation of militarism and far-flung advocacy of the Buddhist dhamma.

The Sangam literature of the Tamil language reveals that, between 200 BCE and

200 CE, the southern peninsula was ruled by the Cheras, the Cholas, and the Pandyas, dynasties that traded extensively with the Roman Empire and with West and Southeast Asia. In North India, Hinduism asserted patriarchal control within the family, leading to increased subordination of women. By the 4th and 5th centuries, the Gupta Empire had created a complex system of administration and taxation in the greater Ganges Plain; this system became a model for later Indian kingdoms. Under the Guptas, a renewed Hinduism based on devotion, rather than the management of ritual, began to assert itself. This renewal was reflected in a flowering of sculpture and architecture, which found patrons among an urban elite. Classical Sanskrit literature flowered as well, and Indian science, astronomy, medicine, and mathematics made significant advances.

### Medieval India

The Indian early medieval age, from 600 to 1200 CE, is defined by regional kingdoms and cultural diversity. When Harsha of Kannauj, who ruled much of the Indo-Gangetic Plain from 606 to 647 CE, attempted to expand southwards, he was defeated by the Chalukya ruler of the Deccan. When his successor attempted to expand eastwards, he was defeated by the Pala king of Bengal. When the Chalukyas attempted to expand southwards, they were defeated by the Pallavas from farther south, who in turn were opposed by the Pandyas and the Cholas from still farther south. No ruler of this period was able to create an empire and consistently control lands much beyond their core region. During this time, pastoral peoples, whose land had been cleared to make way for the growing agricultural economy, were accommodated within caste society, as were new non-traditional ruling classes. The caste system consequently began to show regional differences.

In the 6th and 7th centuries, the first devotional hymns were created in the Tamil language. They were imitated all over India and led to both the resurgence of Hinduism and the development of all modern languages of the subcontinent.

Indian royalty, big and small, and the temples they patronised drew citizens in great numbers to the capital cities, which became economic hubs as well. Temple towns of various sizes began to appear everywhere as India underwent another urbanisation. By the 8th and 9th centuries, the effects were felt in Southeast Asia, as South Indian culture and political systems were exported to lands that became part of modern-day Myanmar, Thailand, Laos, Brunei, Cambodia, Vietnam, Philippines, Malaysia, and Indonesia. Indian merchants, scholars, and sometimes armies were involved in this transmission; Southeast Asians took the initiative as well, with many sojourning in Indian seminaries and translating Buddhist and Hindu texts into their languages.

After the 10th century, Muslim Central Asian nomadic clans, using swift-horse cavalry and raising vast armies united by ethnicity and religion, repeatedly overran South Asia's north-western plains, leading eventually to the establishment of the Islamic Delhi Sultanate in 1206. The sultanate was to control much of North India and to make many forays into South India. Although at first disruptive for the Indian elites, the sultanate largely left its vast non-Muslim subject population to its own laws and customs. By repeatedly repulsing Mongol raiders in the 13th century, the sultanate saved India from the devastation visited on West and Central Asia, setting the scene for centuries of migration of fleeing soldiers, learned men, mystics, traders, artists, and



artisans from that region into the subcontinent, thereby creating a syncretic Indo-Islamic culture in the north. The sultanate's raiding and weakening of the regional kingdoms of South India paved the way for the indigenous Vijayanagara Empire. Embracing a strong Shaivite tradition and building upon the military technology of the sultanate, the empire came to control much of peninsular India, and was to influence South Indian society for long afterwards.

#### Early modern India

In the early 16th century, northern India, then under mainly Muslim rulers, fell again to the superior mobility and firepower of a new generation of Central Asian warriors. The resulting Mughal Empire did not stamp out the local societies it came to rule. Instead, it balanced and pacified them through new administrative practices and diverse and inclusive ruling elites, leading to more systematic, centralised, and uniform rule. Eschewing tribal bonds and Islamic identity, especially under Akbar, the Mughals united their far-flung realms through loyalty, expressed through a Persianised culture, to an emperor who had near-divine status. The Mughal state's economic policies, deriving most revenues from agriculture and mandating that taxes be paid in the well-regulated silver currency, caused peasants and artisans to enter larger markets. The relative peace maintained by the empire during much of the 17th century was a factor in India's economic expansion, resulting in greater patronage of painting, literary forms, textiles, and architecture. Newly coherent social groups in northern and western India, such as the Marathas, the Rajputs, and the Sikhs, gained military and governing ambitions during Mughal rule, which, through collaboration or adversity, gave them both recognition and military experience. Expanding commerce during Mughal rule gave rise to new Indian commercial and political elites along the coasts of southern and eastern India. As the empire disintegrated, many among these elites were able to seek and control their own affairs.

By the early 18th century, with the lines between commercial and political dominance being increasingly blurred, a number of European trading companies, including the English East India Company, had established coastal outposts. The East India Company's control of the seas, greater resources, and more advanced military training and technology led it to increasingly assert its military strength and caused it to become attractive to a portion of the Indian elite; these factors were crucial in allowing the company to gain control over the Bengal region by 1765 and sideline the other European companies. Its further access to the riches of Bengal and the subsequent increased strength and size of its army enabled it to annex or subdue most of India by the 1820s. India was then no longer exporting manufactured goods as it long had, but was instead supplying the British Empire with raw materials. Many historians consider this to be the onset of India's colonial period. By this time, with its economic power severely curtailed by the British parliament and having effectively been made an arm of British administration, the East India Company began more consciously to enter non-economic arenas, including education, social reform, and culture.

## Modern India

Historians consider India's modern age to have begun sometime between 1848 and 1885. The appointment in 1848 of Lord Dalhousie as Governor General of the East India Company set the stage for changes essential to a modern state. These included the consolidation and demarcation of sovereignty, the surveillance of the population, and the education of citizens. Technological changes-among them, railways, canals, and the telegraph-were introduced not long after their introduction in Europe. However, disaffection with the company also grew during this time and set off the Indian Rebellion of 1857. Fed by diverse resentments and perceptions, including invasive British-style social reforms, harsh land taxes, and summary treatment of some rich landowners and princes, the rebellion rocked many regions of northern and central India and shook the foundations of Company rule. Although the rebellion was suppressed by 1858, it led to the dissolution of the East India Company and the direct administration of India by the British government. Proclaiming a unitary state and a gradual but limited British-style parliamentary system, the new rulers also protected princes and landed gentry as a feudal safeguard against future unrest. In the decades following, public life gradually emerged all over India, leading eventually to the founding of the Indian National Congress in 1885.

The rush of technology and the commercialisation of agriculture in the second half of the 19th century was marked by economic setbacks, and many small farmers became dependent on the whims of far-away markets. There was an increase in the number of large-scale famines, and, despite the risks of infrastructure development borne by Indian taxpayers, little industrial employment was generated for Indians. There were also salutary effects: commercial cropping, especially in the newly canalised Punjab, led to increased food production for internal consumption. The railway network provided critical famine relief, notably reduced the cost of moving goods, and helped nascent Indian-owned industry.

After World War I, in which approximately one million Indians served, a new period began. It was marked by British reforms but also repressive legislation, by more strident Indian calls for self-rule, and by the beginnings of a nonviolent movement of non-co-operation, of which Mahatma Gandhi would become the leader and enduring symbol. During the 1930s, slow legislative reform was enacted by the British; the Indian National Congress won victories in the resulting elections. The next decade was beset with crises: Indian participation in World War II, the Congress's final push for non-co-operation, and an upsurge of Muslim nationalism. All were capped by the advent of independence in 1947, but tempered by the partition of India into two states: India and Pakistan. Vital to India's self-image as an independent nation was its constitution, completed in 1950, which put in place a secular and democratic republic. Per the London Declaration, India retained its membership of the Commonwealth, becoming the first republic within it. Economic liberalisation, which began in the 1980s and the collaboration with Soviet Union for technical know-how, has created a large urban middle class, transformed India into one of the world's fastest-growing economies, and increased its geopolitical clout. Yet, India is also shaped by seemingly unyielding poverty, both rural and urban; by religious and

caste-related violence; by Maoist-inspired Naxalite insurgencies; and by separatism in Jammu and Kashmir and in Northeast India. It has unresolved territorial disputes with China and with Pakistan. India's sustained democratic freedoms are unique among the world's newer nations; however, in spite of its recent economic successes, freedom from want for its disadvantaged population remains a goal yet to be achieved.

### Geography

India accounts for the bulk of the Indian subcontinent, lying atop the Indian tectonic plate, a part of the Indo-Australian Plate. India's defining geological processes began 75 million years ago when the Indian Plate, then part of the southern supercontinent Gondwana, began a north-eastward drift caused by seafloor spreading to its south-west, and later, south and south-east. Simultaneously, the vast Tethyan oceanic crust, to its northeast, began to subduct under the Eurasian Plate. These dual processes, driven by convection in the Earth's mantle, both created the Indian Ocean and caused the Indian continental crust eventually to under-thrust Eurasia and to uplift the Himalayas. Immediately south of the emerging Himalayas, plate movement created a vast crescent-shaped trough that rapidly filled with river-borne sediment and now constitutes the Indo-Gangetic Plain. The original Indian plate makes its first appearance above the sediment in the ancient Aravalli range, which extends from the Delhi Ridge in a southwesterly direction. To the west lies the Thar Desert, the eastern spread of which is checked by the Aravallis.

The remaining Indian Plate survives as peninsular India, the oldest and geologically most stable part of India. It extends as far north as the Satpura and Vindhya ranges in central India. These parallel chains run from the Arabian Sea coast in Gujarat in the west to the coal-rich Chota Nagpur Plateau in Jharkhand in the east. To the south, the remaining peninsular landmass, the Deccan Plateau, is flanked on the west and east by coastal ranges known as the Western and Eastern Ghats; the plateau contains the country's oldest rock formations, some over one billion years old. Constituted in such fashion, India lies to the north of the equator between 6° 44' and 35° 30' north latitude and 68° 7' and 97° 25' east longitude.

India's coastline measures 7,517 kilometres (4,700 mi) in length; of this distance, 5,423 kilometres (3,400 mi) belong to peninsular India and 2,094 kilometres (1,300 mi) to the Andaman, Nicobar, and Lakshadweep island chains. According to the Indian naval hydrographic charts, the mainland coastline consists of the following: 43% sandy beaches; 11% rocky shores, including cliffs; and 46% mudflats or marshy shores.

Major Himalayan-origin rivers that substantially flow through India include the Ganges and the Brahmaputra, both of which drain into the Bay of Bengal. Important tributaries of the Ganges include the Yamuna and the Kosi; the latter's extremely low gradient, caused by long-term silt deposition, leads to severe floods and course changes. Major peninsular rivers, whose steeper gradients prevent their waters from flooding, include the Godavari, the Mahanadi, the Kaveri, and the Krishna, which also drain into the Bay of Bengal; and the Narmada and the Tapti, which drain into the Arabian Sea. Coastal

features include the marshy Rann of Kutch of western India and the alluvial Sundarbans delta of eastern India; the latter is shared with Bangladesh. India has two archipelagos: the Lakshadweep, coral atolls off India's south-western coast; and the Andaman and Nicobar Islands, a volcanic chain in the Andaman Sea. Indian climate is strongly influenced by the Himalayas and the Thar Desert, both of which drive the economically and culturally pivotal summer and winter monsoons. The Himalayas prevent cold Central Asian katabatic winds from blowing in, keeping the bulk of the Indian subcontinent warmer than most locations at similar latitudes. The Thar Desert plays a crucial role in attracting the moisture-laden south-west summer monsoon winds that, between June and October, provide the majority of India's rainfall. Four major climatic groupings predominate in India: tropical wet, tropical dry, subtropical humid, and montane.

Temperatures in India have risen by 0.7 °C (1.3 °F) between 1901 and 2018. Climate change in India is often thought to be the cause. The retreat of Himalayan glaciers has adversely affected the flow rate of the major Himalayan rivers, including the Ganges and the Brahmaputra. According to some current projections, the number and severity of droughts in India will have markedly increased by the end of the present century. The right "to be free from adverse impacts of climate change" is legally recognized as a fundamental right in India.

#### Biodiversity

India is a megadiverse country, a term employed for 17 countries which display high biological diversity and contain many species exclusively indigenous, or endemic, to them. India is a habitat for 8.6% of all mammal species, 13.7% of bird species, 7.9% of reptile species, 6% of amphibian species, 12.2% of fish species, and 6.0% of all flowering plant species. Fully a third of Indian plant species are endemic. India also contains four of the world's 34 biodiversity hotspots, or regions that display significant habitat loss in the presence of high endemism.

According to official statistics, India's forest cover is 713,789 km<sup>2</sup> (275,595 sq mi), which is 21.71% of the country's total land area. It can be subdivided further into broad categories of canopy density, or the proportion of the area of a forest covered by its tree canopy. Very dense forest, whose canopy density is greater than 70%, occupies 3.02% of India's land area. It predominates in the tropical moist forest of the Andaman Islands, the Western Ghats, and Northeast India. Moderately dense forest, whose canopy density is between 40% and 70%, occupies 9.39% of India's land area. It predominates in the temperate coniferous forest of the Himalayas, the moist deciduous sal forest of eastern India, and the dry deciduous teak forest of central and southern India. Open forest, whose canopy density is between 10% and 40%, occupies 9.26% of India's land area. India has two natural zones of thorn forest, one in the Deccan Plateau, immediately east of the Western Ghats, and the other in the western part of the Indo-Gangetic plain, now turned into rich agricultural land by irrigation, its features no longer visible.

Among the Indian subcontinent's notable indigenous trees are the astringent *Azadirachta indica*, or neem, which is widely used in rural Indian herbal

medicine, and the luxuriant *Ficus religiosa*, or peepul, which is displayed on the ancient seals of Mohenjo-daro, and under which the Buddha is recorded in the Pali canon to have sought enlightenment.

Many Indian species have descended from those of Gondwana, the southern supercontinent from which India separated more than 100 million years ago. India's subsequent collision with Eurasia set off a mass exchange of species. However, volcanism and climatic changes later caused the extinction of many endemic Indian forms. Still later, mammals entered India from Asia through two zoogeographical passes flanking the Himalayas. This had the effect of lowering endemism among India's mammals, which stands at 12.6%, contrasting with 45.8% among reptiles and 55.8% among amphibians. Among endemics are the vulnerable hooded leaf monkey and the threatened Beddome's toad of the Western Ghats. India contains 172 IUCN-designated threatened animal species, or 2.9% of endangered forms. These include the endangered Bengal tiger and the Ganges river dolphin. Critically endangered species include the gharial, a crocodilian; the great Indian bustard; and the Indian white-rumped vulture, which has become nearly extinct by having ingested the carrion of diclofenac-treated cattle. Before they were extensively used for agriculture and cleared for human settlement, the thorn forests of Punjab were mingled at intervals with open grasslands that were grazed by large herds of blackbuck preyed on by the Asiatic cheetah; the blackbuck, no longer extant in Punjab, is now severely endangered in India, and the cheetah is extinct. The pervasive and ecologically devastating human encroachment of recent decades has critically endangered Indian wildlife. In response, the system of national parks and protected areas, first established in 1935, was expanded substantially. In 1972, India enacted the Wildlife Protection Act and Project Tiger to safeguard crucial wilderness; the Forest Conservation Act was enacted in 1980 and amendments added in 1988. India hosts more than five hundred wildlife sanctuaries and eighteen biosphere reserves, four of which are part of the World Network of Biosphere Reserves; seventy-five wetlands are registered under the Ramsar Convention.

## Politics and government

### Politics

A parliamentary republic with a multi-party system, India has six recognised national parties, including the Indian National Congress (INC) and the Bharatiya Janata Party (BJP), and more than 50 regional parties. The Congress is considered centre in Indian political culture, and the BJP right-wing. For most of the period between 1950-when India first became a republic-and the late 1980s, the Congress held a majority in the Parliament. Since then, however, it has increasingly shared the political stage with the BJP, as well as with powerful regional parties which have often forced the creation of multi-party coalition governments at the centre.

In the Republic of India's first three general elections, in 1951, 1957, and 1962, the Pandit Jawaharlal Nehru-led Congress won easy victories. On Nehru's death in 1964, Lal Bahadur Shastri briefly became prime minister; he was succeeded, after his own unexpected death in 1966, by Nehru's daughter Indira Gandhi, who went on to lead the Congress to election victories in 1967 and 1971. Following public discontent with the state of emergency she declared in 1975,

the Congress was voted out of power in 1977; the then-new Janata Party, which had opposed the emergency, was voted in. Its government lasted just over two years. There were two prime ministers during this period; Morarji Desai and Charan Singh. Voted back into power in 1980, the Congress saw a change in leadership in 1984, when Indira Gandhi was assassinated; she was succeeded by her son Rajiv Gandhi, who won an easy victory in the general elections later that year. The Congress was voted out again in 1989 when a National Front coalition, led by the newly formed Janata Dal in alliance with the Left Front, won the elections; that government too proved relatively short-lived, lasting just under two years. There were two prime ministers during this period; V.P. Singh and Chandra Shekhar. Elections were held again in 1991; no party won an absolute majority. The Congress, as the largest single party, was able to form a minority government led by P. V. Narasimha Rao.

A two-year period of political turmoil followed the general election of 1996. Several short-lived alliances shared power at the centre. The BJP formed a government briefly in 1996; it was followed by two comparatively long-lasting United Front coalitions, which depended on external support. There were two prime ministers during this period; H.D. Deve Gowda and I.K. Gujral. In 1998, the BJP was able to form a successful coalition, the National Democratic Alliance (NDA). Led by Atal Bihari Vajpayee, the NDA became the first non-Congress, coalition government to complete a five-year term. Again in the 2004 Indian general elections, no party won an absolute majority, but the Congress emerged as the largest single party, forming another successful coalition: the United Progressive Alliance (UPA). It had the support of left-leaning parties and MPs who opposed the BJP. The UPA returned to power in the 2009 general election with increased numbers, and it no longer required external support from India's communist parties. That year, Manmohan Singh became the first prime minister since Jawaharlal Nehru in 1957 and 1962 to be re-elected to a consecutive five-year term. In the 2014 general election, the BJP became the first political party since 1984 to win a majority and govern without the support of other parties. In the 2019 general election, the BJP was victorious again. Narendra Modi, a former chief minister of Gujarat, is serving as the 14th Prime Minister of India in his third term since May 26, 2014. On 22 July 2022, Droupadi Murmu was elected India's 15th president and took the oath of office on 25 July 2022.

#### Government

India is a federation with a parliamentary system governed under the Constitution of India-the country's supreme legal document. It is a constitutional republic.

Federalism in India defines the power distribution between the union and the states. The Constitution of India, which came into effect on 26 January 1950, originally stated India to be a "sovereign, democratic republic;" this characterisation was amended in 1971 to "a sovereign, socialist, secular, democratic republic". India's form of government, traditionally described as "quasi-federal" with a strong centre and weak states, has grown increasingly federal since the late 1990s as a result of political, economic, and social

changes.

The Government of India comprises three branches:

**Executive:** The President of India is the ceremonial head of state, who is elected indirectly for a five-year term by an electoral college comprising members of national and state legislatures. The Prime Minister of India is the head of government and exercises most executive power. Appointed by the president, the prime minister is by convention supported by the party or political alliance having a majority of seats in the lower house of parliament. The executive of the Indian government consists of the president, the vice-president, and the Union Council of Ministers-with the cabinet being its executive committee-headed by the prime minister. Any minister holding a portfolio must be a member of one of the houses of parliament. In the Indian parliamentary system, the executive is subordinate to the legislature; the prime minister and their council are directly responsible to the lower house of the parliament. Civil servants act as permanent executives and all decisions of the executive are implemented by them.

**Legislature:** The legislature of India is the bicameral parliament. Operating under a Westminster-style parliamentary system, it comprises an upper house called the Rajya Sabha (Council of States) and a lower house called the Lok Sabha (House of the People). The Rajya Sabha is a permanent body of 245 members who serve staggered six-year terms. Most are elected indirectly by the state and union territorial legislatures in numbers proportional to their state's share of the national population. All but two of the Lok Sabha's 545 members are elected directly by popular vote; they represent single-member constituencies for five-year terms. Two seats of parliament, reserved for Anglo-Indians in the article 331, have been scrapped.

**Judiciary:** India has a three-tier unitary independent judiciary comprising the supreme court, headed by the Chief Justice of India, 25 high courts, and a large number of trial courts. The supreme court has original jurisdiction over cases involving fundamental rights and over disputes between states and the centre and has appellate jurisdiction over the high courts. It has the power to both strike down union or state laws which contravene the constitution and invalidate any government action it deems unconstitutional.

#### Administrative divisions

India is a federal union comprising 28 states and 8 union territories. All states, as well as the union territories of Jammu and Kashmir, Puducherry and the National Capital Territory of Delhi, have elected legislatures and governments following the Westminster system of governance. The remaining five union territories are directly ruled by the central government through appointed administrators. In 1956, under the States Reorganisation Act, states were reorganised on a linguistic basis. There are over a quarter of a million local government bodies at city, town, block, district and village levels.

States

Union territories

Foreign, economic and strategic relations

In the 1950s, India strongly supported decolonisation in Africa and Asia and played a leading role in the Non-Aligned Movement. After initially cordial relations with neighbouring China, India went to war with China in 1962 and was widely thought to have been humiliated. This was followed by another military conflict in 1967 in which India successfully repelled Chinese attack. India has had tense relations with neighbouring Pakistan; the two nations have gone to war four times: in 1947, 1965, 1971, and 1999. Three of these wars were fought over the disputed territory of Kashmir, while the third, the 1971 war, followed from India's support for the independence of Bangladesh. In the late 1980s, the Indian military twice intervened abroad at the invitation of the host country: a peace-keeping operation in Sri Lanka between 1987 and 1990; and an armed intervention to prevent a 1988 coup d'état attempt in the Maldives. After the 1965 war with Pakistan, India began to pursue close military and economic ties with the Soviet Union; by the late 1960s, the Soviet Union was its largest arms supplier.

Aside from its ongoing special relationship with Russia, India has wide-ranging defence relations with Israel and France. In recent years, it has played key roles in the South Asian Association for Regional Cooperation and the World Trade Organization. The nation has provided 100,000 military and police personnel to serve in 35 UN peacekeeping operations across four continents. It participates in the East Asia Summit, the G8+5, and other multilateral forums. India has close economic ties with countries in South America, Asia, and Africa; it pursues a "Look East" policy that seeks to strengthen partnerships with the ASEAN nations, Japan, and South Korea that revolve around many issues, but especially those involving economic investment and regional security.

China's nuclear test of 1964, as well as its repeated threats to intervene in support of Pakistan in the 1965 war, convinced India to develop nuclear weapons. India conducted its first nuclear weapons test in 1974 and carried out additional underground testing in 1998. Despite criticism and military sanctions, India has signed neither the Comprehensive Nuclear-Test-Ban Treaty nor the Nuclear Non-Proliferation Treaty, considering both to be flawed and discriminatory. India maintains a "no first use" nuclear policy and is developing a nuclear triad capability as a part of its "Minimum Credible Deterrence" doctrine. It is developing a ballistic missile defence shield and, a fifth-generation fighter jet. Other indigenous military projects involve the design and implementation of Vikrant-class aircraft carriers and Arihant-class nuclear submarines.

Since the end of the Cold War, India has increased its economic, strategic, and military co-operation with the United States and the European Union. In 2008, a civilian nuclear agreement was signed between India and the United States. Although India possessed nuclear weapons at the time and was not a party to the Nuclear Non-Proliferation Treaty, it received waivers from the International Atomic Energy Agency and the Nuclear Suppliers Group, ending earlier restrictions on India's nuclear technology and commerce. As a consequence, India became the sixth de facto nuclear weapons state. India subsequently signed co-operation agreements involving civilian nuclear energy with Russia, France, the



United Kingdom, and Canada.

The President of India is the supreme commander of the nation's armed forces; with 1.45 million active troops, they compose the world's second-largest military. It comprises the Indian Army, the Indian Navy, the Indian Air Force, and the Indian Coast Guard. The official Indian defence budget for 2011 was US\$36.03 billion, or 1.83% of GDP. Defence expenditure was pegged at US\$70.12 billion for fiscal year 2022-23 and, increased 9.8% than previous fiscal year. India is the world's second-largest arms importer; between 2016 and 2020, it accounted for 9.5% of the total global arms imports. Much of the military expenditure was focused on defence against Pakistan and countering growing Chinese influence in the Indian Ocean. In May 2017, the Indian Space Research Organisation launched the South Asia Satellite, a gift from India to its neighbouring SAARC countries. In October 2018, India signed a US\$5.43 billion (over 400 billion) agreement with Russia to procure four S-400 Triumf surface-to-air missile defence systems, Russia's most advanced long-range missile defence system.

#### Economy

According to the International Monetary Fund (IMF), the Indian economy in 2024 was nominally worth \$3.94 trillion; it was the fifth-largest economy by market exchange rates and is, at around \$15.0 trillion, the third-largest by purchasing power parity (PPP). With its average annual GDP growth rate of 5.8% over the past two decades, and reaching 6.1% during 2011-2012, India is one of the world's fastest-growing economies. However, the country ranks 136th in the world in nominal GDP per capita and 125th in GDP per capita at PPP. Until 1991, all Indian governments followed protectionist policies that were influenced by socialist economics. Widespread state intervention and regulation largely walled the economy off from the outside world. An acute balance of payments crisis in 1991 forced the nation to liberalise its economy; since then, it has moved increasingly towards a free-market system by emphasising both foreign trade and direct investment inflows. India has been a member of World Trade Organization since 1 January 1995.

The 522-million-worker Indian labour force is the world's second-largest, as of 2017. The service sector makes up 55.6% of GDP, the industrial sector 26.3% and the agricultural sector 18.1%. India's foreign exchange remittances of US\$100 billion in 2022, highest in the world, were contributed to its economy by 32 million Indians working in foreign countries. Major agricultural products include rice, wheat, oilseed, cotton, jute, tea, sugarcane, and potatoes. Major industries include textiles, telecommunications, chemicals, pharmaceuticals, biotechnology, food processing, steel, transport equipment, cement, mining, petroleum, machinery, and software. In 2006, the share of external trade in India's GDP stood at 24%, up from 6% in 1985. In 2008, India's share of world trade was 1.7%; In 2021, India was the world's ninth-largest importer and the sixteenth-largest exporter. Major exports include petroleum products, textile goods, jewellery, software, engineering goods, chemicals, and manufactured leather goods. Major imports include crude oil, machinery, gems, fertiliser, and chemicals. Between 2001 and 2011, the contribution of petrochemical and

engineering goods to total exports grew from 14% to 42%. India was the world's second-largest textile exporter after China in the 2013 calendar year. Averaging an economic growth rate of 7.5% for several years prior to 2007, India has more than doubled its hourly wage rates during the first decade of the 21st century. Some 431 million Indians have left poverty since 1985; India's middle classes are projected to number around 580 million by 2030. Though ranking 68th in global competitiveness, as of 2010, India ranks 17th in financial market sophistication, 24th in the banking sector, 44th in business sophistication, and 39th in innovation, ahead of several advanced economies. With seven of the world's top 15 information technology outsourcing companies based in India, as of 2009, the country is viewed as the second-most favourable outsourcing destination after the United States. India is ranked 40th in the Global Innovation Index in 2023. As of 2023, India's consumer market was the world's fifth-largest.

Driven by growth, India's nominal GDP per capita increased steadily from US\$308 in 1991, when economic liberalisation began, to US\$1,380 in 2010, to an estimated US\$2,731 in 2024. It is expected to grow to US\$3,264 by 2026. However, it has remained lower than those of other Asian developing countries such as Indonesia, Malaysia, Philippines, Sri Lanka, and Thailand, and is expected to remain so in the near future.

According to a 2011 PricewaterhouseCoopers (PwC) report, India's GDP at purchasing power parity could overtake that of the United States by 2045. During the next four decades, Indian GDP is expected to grow at an annualised average of 8%, making it potentially the world's fastest-growing major economy until 2050. The report highlights key growth factors: a young and rapidly growing working-age population; growth in the manufacturing sector because of rising education and engineering skill levels; and sustained growth of the consumer market driven by a rapidly growing middle-class. The World Bank cautions that, for India to achieve its economic potential, it must continue to focus on public sector reform, transport infrastructure, agricultural and rural development, removal of labour regulations, education, energy security, and public health and nutrition.

According to the Worldwide Cost of Living Report 2017 released by the Economist Intelligence Unit (EIU) which was created by comparing more than 400 individual prices across 160 products and services, four of the cheapest cities were in India: Bangalore (3rd), Mumbai (5th), Chennai (5th) and New Delhi (8th).

## Industries

India's telecommunication industry is the second-largest in the world with over 1.2 billion subscribers. It contributes 6.5% to India's GDP. After the third quarter of 2017, India surpassed the US to become the second-largest smartphone market in the world after China.

The Indian automotive industry, the world's second-fastest growing, increased domestic sales by 26% during 2009–2010, and exports by 36% during 2008–2009. In 2022, India became the world's third-largest vehicle market after China and the United States, surpassing Japan. At the end of 2011, the Indian IT industry employed 2.8 million professionals, generated revenues close to US\$100 billion

equalling 7.5% of Indian GDP, and contributed 26% of India's merchandise exports.

The pharmaceutical industry in India emerged as a global player. As of 2021, with 3000 pharmaceutical companies and 10,500 manufacturing units India is the world's third-largest pharmaceutical producer, largest producer of generic medicines and supply up to 50-60% of global vaccines demand, these all contribute up to US\$24.44 billions in exports and India's local pharmaceutical market is estimated up to US\$42 billion. India is among the top 12 biotech destinations in the world. The Indian biotech industry grew by 15.1% in 2012-2013, increasing its revenues from 204.4 billion (Indian rupees) to 235.24 billion (US\$3.94 billion at June 2013 exchange rates).

### Energy

India's capacity to generate electrical power is 300 gigawatts, of which 42 gigawatts is renewable. The country's usage of coal is a major cause of greenhouse gas emissions by India but its renewable energy is competing strongly. India emits about 7% of global greenhouse gas emissions. This equates to about 2.5 tons of carbon dioxide per person per year, which is half the world average. Increasing access to electricity and clean cooking with liquefied petroleum gas have been priorities for energy in India.

### Socio-economic challenges

Despite economic growth during recent decades, India continues to face socio-economic challenges. In 2006, India contained the largest number of people living below the World Bank's international poverty line of US\$1.25 per day. The proportion decreased from 60% in 1981 to 42% in 2005. Under the World Bank's later revised poverty line, it was 21% in 2011. 30.7% of India's children under the age of five are underweight. According to a Food and Agriculture Organization report in 2015, 15% of the population is undernourished. The Midday Meal Scheme attempts to lower these rates.

A 2018 Walk Free Foundation report estimated that nearly 8 million people in India were living in different forms of modern slavery, such as bonded labour, child labour, human trafficking, and forced begging, among others. According to the 2011 census, there were 10.1 million child labourers in the country, a decline of 2.6 million from 12.6 million in 2001.

Since 1991, economic inequality between India's states has consistently grown: the per-capita net state domestic product of the richest states in 2007 was 3.2 times that of the poorest. Corruption in India is perceived to have decreased. According to the Corruption Perceptions Index, India ranked 78th out of 180 countries in 2018 with a score of 41 out of 100, an improvement from 85th in 2014.

Epidemic and pandemic diseases have long been a major factor, including COVID-19 and cholera.

### Demographics, languages and religion

With an estimated 1,428,627,663 residents in 2023, India is the world's most populous country. 1,210,193,422 residents were reported in the 2011 provisional census report. Its population grew by 17.64% from 2001 to 2011, compared to

21.54% growth in the previous decade (1991-2001). The human sex ratio, according to the 2011 census, is 940 females per 1,000 males. The median age was 28.7 as of 2020. The first post-colonial census, conducted in 1951, counted 361 million people. Medical advances made in the last 50 years as well as increased agricultural productivity brought about by the "Green Revolution" have caused India's population to grow rapidly.

The life expectancy in India is at 70 years-71.5 years for women, 68.7 years for men. There are around 93 physicians per 100,000 people. Migration from rural to urban areas has been an important dynamic in India's recent history. The number of people living in urban areas grew by 31.2% between 1991 and 2001. Yet, in 2001, over 70% still lived in rural areas. The level of urbanisation increased further from 27.81% in the 2001 Census to 31.16% in the 2011 Census. The slowing down of the overall population growth rate was due to the sharp decline in the growth rate in rural areas since 1991. According to the 2011 census, there are 53 million-plus urban agglomerations in India; among them Mumbai, Delhi, Kolkata, Chennai, Bangalore, Hyderabad and Ahmedabad, in decreasing order by population. The literacy rate in 2011 was 74.04%: 65.46% among females and 82.14% among males. The rural-urban literacy gap, which was 21.2 percentage points in 2001, dropped to 16.1 percentage points in 2011. The improvement in the rural literacy rate is twice that of urban areas. Kerala is the most literate state with 93.91% literacy; while Bihar the least with 63.82%.

Among speakers of the Indian languages, 74% speak Indo-Aryan languages, the easternmost branch of the Indo-European languages; 24% speak Dravidian languages, indigenous to South Asia and spoken widely before the spread of Indo-Aryan languages and 2% speak Austroasiatic languages or the Sino-Tibetan languages. India has no national language. Hindi, with the largest number of speakers, is the official language of the government. English is used extensively in business and administration and has the status of a "subsidiary official language"; it is important in education, especially as a medium of higher education. Each state and union territory has one or more official languages, and the constitution recognises in particular 22 "scheduled languages".

The 2011 census reported the religion in India with the largest number of followers was Hinduism (79.80% of the population), followed by Islam (14.23%); the remaining were Christianity (2.30%), Sikhism (1.72%), Buddhism (0.70%), Jainism (0.36%) and others (0.9%). India has the third-largest Muslim population-the largest for a non-Muslim majority country.

## Culture

Indian cultural history spans more than 4,500 years. During the Vedic period (c. 1700 BCE - c. 500 BCE), the foundations of Hindu philosophy, mythology, theology and literature were laid, and many beliefs and practices which still exist today, such as dhárma, kârma, yóga, and mokṣa, were established. India is notable for its religious diversity, with Hinduism, Buddhism, Sikhism, Islam, Christianity, and Jainism among the nation's major religions. The predominant religion, Hinduism, has been shaped by various historical schools of thought, including those of the Upanishads, the Yoga Sutras, the Bhakti movement, and by

Buddhist philosophy.

#### Visual art

India has a very ancient tradition of art, which has exchanged many influences with the rest of Eurasia, especially in the first millennium, when Buddhist art spread with Indian religions to Central, East and Southeast Asia, the last also greatly influenced by Hindu art. Thousands of seals from the Indus Valley Civilization of the third millennium BCE have been found, usually carved with animals, but a few with human figures. The "Pashupati" seal, excavated in Mohenjo-daro, Pakistan, in 1928-29, is the best known. After this there is a long period with virtually nothing surviving. Almost all surviving ancient Indian art thereafter is in various forms of religious sculpture in durable materials, or coins. There was probably originally far more in wood, which is lost. In north India Mauryan art is the first imperial movement. In the first millennium CE, Buddhist art spread with Indian religions to Central, East and Southeast Asia, the last also greatly influenced by Hindu art. Over the following centuries a distinctly Indian style of sculpting the human figure developed, with less interest in articulating precise anatomy than ancient Greek sculpture but showing smoothly flowing forms expressing prana ("breath" or life-force). This is often complicated by the need to give figures multiple arms or heads, or represent different genders on the left and right of figures, as with the Ardhanarishvara form of Shiva and Parvati.

Most of the earliest large sculpture is Buddhist, either excavated from Buddhist stupas such as Sanchi, Sarnath and Amaravati, or is rock cut reliefs at sites such as Ajanta, Karla and Ellora. Hindu and Jain sites appear rather later. In spite of this complex mixture of religious traditions, generally, the prevailing artistic style at any time and place has been shared by the major religious groups, and sculptors probably usually served all communities. Gupta art, at its peak c. 300 CE - c. 500 CE, is often regarded as a classical period whose influence lingered for many centuries after; it saw a new dominance of Hindu sculpture, as at the Elephanta Caves. Across the north, this became rather stiff and formulaic after c. 800 CE, though rich with finely carved detail in the surrounds of statues. But in the South, under the Pallava and Chola dynasties, sculpture in both stone and bronze had a sustained period of great achievement; the large bronzes with Shiva as Nataraja have become an iconic symbol of India. Ancient painting has only survived at a few sites, of which the crowded scenes of court life in the Ajanta Caves are by far the most important, but it was evidently highly developed, and is mentioned as a courtly accomplishment in Gupta times. Painted manuscripts of religious texts survive from Eastern India about the 10th century onwards, most of the earliest being Buddhist and later Jain. No doubt the style of these was used in larger paintings. The Persian-derived Deccan painting, starting just before the Mughal miniature, between them give the first large body of secular painting, with an emphasis on portraits, and the recording of princely pleasures and wars. The style spread to Hindu courts, especially among the Rajputs, and developed a variety of styles, with the smaller courts often the most innovative, with figures such as Nihâl Chand and Nainsukh. As a market developed among European residents, it was supplied by Company painting by Indian artists with considerable Western influence. In the

19th century, cheap Kalighat paintings of gods and everyday life, done on paper, were urban folk art from Calcutta, which later saw the Bengal School of Art, reflecting the art colleges founded by the British, the first movement in modern Indian painting.

#### Architecture

Much of Indian architecture, including the Taj Mahal, other works of Indo-Islamic Mughal architecture, and South Indian architecture, blends ancient local traditions with imported styles. Vernacular architecture is also regional in its flavours. Vastu shastra, literally "science of construction" or "architecture" and ascribed to Mamuni Mayan, explores how the laws of nature affect human dwellings; it employs precise geometry and directional alignments to reflect perceived cosmic constructs. As applied in Hindu temple architecture, it is influenced by the Shilpa Shastras, a series of foundational texts whose basic mythological form is the Vastu-Purusha mandala, a square that embodied the "absolute". The Taj Mahal, built in Agra between 1631 and 1648 by orders of Mughal emperor Shah Jahan in memory of his wife, has been described in the UNESCO World Heritage List as "the jewel of Muslim art in India and one of the universally admired masterpieces of the world's heritage". Indo-Saracenic Revival architecture, developed by the British in the late 19th century, drew on Indo-Islamic architecture.

#### Literature

The earliest literature in India, composed between 1500 BCE and 1200 CE, was in the Sanskrit language. Major works of Sanskrit literature include the Rigveda (c. 1500 BCE - c. 1200 BCE), the epics: Mahābhārata (c. 400 BCE - c. 400 CE) and the Ramayana (c. 300 BCE and later); Abhijñānaśākuntalam (The Recognition of Śakuntalā, and other dramas of Kālidāsa (c. 5th century CE) and Mahākāvya poetry. In Tamil literature, the Sangam literature (c. 600 BCE - c. 300 BCE) consisting of 2,381 poems, composed by 473 poets, is the earliest work. From the 14th to the 18th centuries, India's literary traditions went through a period of drastic change because of the emergence of devotional poets like Kabīr, Tulsīdās, and Guru Nānak. This period was characterised by a varied and wide spectrum of thought and expression; as a consequence, medieval Indian literary works differed significantly from classical traditions. In the 19th century, Indian writers took a new interest in social questions and psychological descriptions. In the 20th century, Indian literature was influenced by the works of the Bengali poet, author and philosopher Rabindranath Tagore, who was a recipient of the Nobel Prize in Literature.

#### Performing arts and media

Indian music ranges over various traditions and regional styles. Classical music encompasses two genres and their various folk offshoots: the northern Hindustani and the southern Carnatic schools. Regionalised popular forms include filmi and folk music; the syncretic tradition of the bauls is a well-known form of the latter. Indian dance also features diverse folk and classical forms. Among the better-known folk dances are: bhangra of Punjab, bihu of Assam, Jhumair and chhau of Jharkhand, Odisha and West Bengal, garba and dandiya of Gujarat,

ghoomar of Rajasthan, and lavani of Maharashtra. Eight dance forms, many with narrative forms and mythological elements, have been accorded classical dance status by India's National Academy of Music, Dance, and Drama. These are: bharatanatyam of the state of Tamil Nadu, kathak of Uttar Pradesh, kathakali and mohiniyattam of Kerala, kuchipudi of Andhra Pradesh, manipuri of Manipur, odissi of Odisha, and the sattriya of Assam.

Theatre in India melds music, dance, and improvised or written dialogue. Often based on Hindu mythology, but also borrowing from medieval romances or social and political events, Indian theatre includes: the bhavai of Gujarat, the jatra of West Bengal, the nautanki and ramlila of North India, tamasha of Maharashtra, burrakatha of Andhra Pradesh and Telangana, terukkuttu of Tamil Nadu, and the yakshagana of Karnataka. India has a theatre training institute the National School of Drama (NSD) that is situated at New Delhi. It is an autonomous organisation under the Ministry of culture, Government of India.

The Indian film industry produces the world's most-watched cinema. Established regional cinematic traditions exist in the Assamese, Bengali, Bhojpuri, Hindi, Kannada, Malayalam, Punjabi, Gujarati, Marathi, Odia, Tamil, and Telugu languages. The Hindi language film industry (Bollywood) is the largest sector representing 43% of box office revenue, followed by the South Indian Telugu and Tamil film industries which represent 36% combined.

Television broadcasting began in India in 1959 as a state-run medium of communication and expanded slowly for more than two decades. The state monopoly on television broadcast ended in the 1990s. Since then, satellite channels have increasingly shaped the popular culture of Indian society. Today, television is the most penetrative media in India; industry estimates indicate that as of 2012 there are over 554 million TV consumers, 462 million with satellite or cable connections compared to other forms of mass media such as the press (350 million), radio (156 million) or internet (37 million).

## Society

Traditional Indian society is sometimes defined by social hierarchy. The Indian caste system embodies much of the social stratification and many of the social restrictions found on the Indian subcontinent. Social classes are defined by thousands of endogamous hereditary groups, often termed as jātis, or "castes". India abolished untouchability in 1950 with the adoption of the constitution and has since enacted other anti-discriminatory laws and social welfare initiatives. Family values are important in the Indian tradition, and multi-generational patrilineal joint families have been the norm in India, though nuclear families are becoming common in urban areas. An overwhelming majority of Indians, with their consent, have their marriages arranged by their parents or other family elders. Marriage is thought to be for life, and the divorce rate is extremely low, with less than one in a thousand marriages ending in divorce. Child marriages are common, especially in rural areas; many women wed before reaching 18, which is their legal marriageable age. Female infanticide in India, and lately female foeticide, have created skewed gender ratios; the number of missing women in the country quadrupled from 15 million to 63 million in the 50-year period ending in 2014, faster than the population growth during the same period, and constituting 20 percent of India's female electorate. According to

an Indian government study, an additional 21 million girls are unwanted and do not receive adequate care. Despite a government ban on sex-selective foeticide, the practice remains commonplace in India, the result of a preference for boys in a patriarchal society. The payment of dowry, although illegal, remains widespread across class lines. Deaths resulting from dowry, mostly from bride burning, are on the rise, despite stringent anti-dowry laws. Many Indian festivals are religious in origin. The best known include Diwali, Ganesh Chaturthi, Thai Pongal, Holi, Durga Puja, Eid ul-Fitr, Bakr-Id, Christmas, and Vaisakhi.

#### Education

In the 2011 census, about 73% of the population was literate, with 81% for men and 65% for women. This compares to 1981 when the respective rates were 41%, 53% and 29%. In 1951 the rates were 18%, 27% and 9%. In 1921 the rates 7%, 12% and 2%. In 1891 they were 5%, 9% and 1%. According to Latika Chaudhary, in 1911 there were under three primary schools for every ten villages. Statistically, more caste and religious diversity reduced private spending. Primary schools taught literacy, so local diversity limited its growth.

The education system of India is the world's second-largest. India has over 900 universities, 40,000 colleges and 1.5 million schools. In India's higher education system, a significant number of seats are reserved under affirmative action policies for the historically disadvantaged. In recent decades India's improved education system is often cited as one of the main contributors to its economic development.

#### Clothing

From ancient times until the advent of the modern, the most widely worn traditional dress in India was draped. For women it took the form of a sari, a single piece of cloth many yards long. The sari was traditionally wrapped around the lower body and the shoulder. In its modern form, it is combined with an underskirt, or Indian petticoat, and tucked in the waist band for more secure fastening. It is also commonly worn with an Indian blouse, or choli, which serves as the primary upper-body garment, the sari's end-passing over the shoulder-serving to cover the midriff and obscure the upper body's contours. For men, a similar but shorter length of cloth, the dhoti, has served as a lower-body garment.

The use of stitched clothes became widespread after Muslim rule was established at first by the Delhi sultanate (c.1300 CE) and then continued by the Mughal Empire (c.1525 CE). Among the garments introduced during this time and still commonly worn are: the shalwars and pyjamas, both styles of trousers, and the tunics kurta and kameez. In southern India, the traditional draped garments were to see much longer continuous use.

Shalwars are atypically wide at the waist but narrow to a cuffed bottom. They are held up by a drawstring, which causes them to become pleated around the waist. The pants can be wide and baggy, or they can be cut quite narrow, on the bias, in which case they are called churidars. When they are ordinarily wide at the waist and their bottoms are hemmed but not cuffed, they are called pyjamas.



The kameez is a long shirt or tunic, its side seams left open below the waist-line. The kurta is traditionally collarless and made of cotton or silk; it is worn plain or with embroidered decoration, such as chikan; and typically falls to either just above or just below the wearer's knees.

In the last 50 years, fashions have changed a great deal in India. Increasingly, in urban northern India, the sari is no longer the apparel of everyday wear, though they remain popular on formal occasions. The traditional shalwar kameez is rarely worn by younger urban women, who favour churidars or jeans. In white-collar office settings, ubiquitous air conditioning allows men to wear sports jackets year-round. For weddings and formal occasions, men in the middle- and upper classes often wear bandgala, or short Nehru jackets, with pants, with the groom and his groomsmen sporting sherwanis and churidars. The dhoti, once the universal garment of Hindu males, the wearing of which in the homespun and handwoven khadi allowed Gandhi to bring Indian nationalism to the millions, is seldom seen in the cities.

### Cuisine

The foundation of a typical Indian meal is a cereal cooked in a plain fashion and complemented with flavourful savoury dishes. The cooked cereal could be steamed rice; chapati, a thin unleavened bread made from wheat flour, or occasionally cornmeal, and griddle-cooked dry; the idli, a steamed breakfast cake, or dosa, a griddled pancake, both leavened and made from a batter of rice- and gram meal. The savoury dishes might include lentils, pulses and vegetables commonly spiced with ginger and garlic, but also with a combination of spices that may include coriander, cumin, turmeric, cinnamon, cardamon and others as informed by culinary conventions. They might also include poultry, fish, or meat dishes. In some instances, the ingredients might be mixed during the process of cooking.

A platter, or thali, used for eating usually has a central place reserved for the cooked cereal, and peripheral ones for the flavourful accompaniments, which are often served in small bowls. The cereal and its accompaniments are eaten simultaneously rather than a piecemeal manner. This is accomplished by mixing-for example of rice and lentils-or folding, wrapping, scooping or dipping-such as chapati and cooked vegetables or lentils.

India has distinctive vegetarian cuisines, each a feature of the geographical and cultural histories of its adherents. The appearance of ahimsa, or the avoidance of violence toward all forms of life in many religious orders early in Indian history, especially Upanishadic Hinduism, Buddhism and Jainism, is thought to have contributed to the predominance of vegetarianism among a large segment of India's Hindu population, especially in southern India, Gujarat, the Hindi-speaking belt of north-central India, as well as among Jains. Although meat is eaten widely in India, the proportional consumption of meat in the overall diet is low. Unlike China, which has increased its per capita meat consumption substantially in its years of increased economic growth, in India the strong dietary traditions have contributed to dairy, rather than meat, becoming the preferred form of animal protein consumption.

The most significant import of cooking techniques into India during the last

millennium occurred during the Mughal Empire. Dishes such as the pilaf, developed in the Abbasid caliphate, and cooking techniques such as the marinating of meat in yogurt, spread into northern India from regions to its northwest. To the simple yogurt marinade of Persia, onions, garlic, almonds, and spices began to be added in India. Rice was partially cooked and layered alternately with the sauteed meat, the pot sealed tightly, and slow cooked according to another Persian cooking technique, to produce what has today become the Indian biryani, a feature of festive dining in many parts of India. In the food served in Indian restaurants worldwide the diversity of Indian food has been partially concealed by the dominance of Punjabi cuisine. The popularity of tandoori chicken-cooked in the tandoor oven, which had traditionally been used for baking bread in the rural Punjab and the Delhi region, especially among Muslims, but which is originally from Central Asia-dates to the 1950s, and was caused in large part by an entrepreneurial response among people from the Punjab who had been displaced by the 1947 partition of India.

#### Sports and recreation

Several traditional indigenous sports such as kabaddi, kho kho, pehlwani and gilli-danda, and also martial arts such as Kalarippayattu and marma adi, remain popular. Chess is commonly held to have originated in India as chaturanga; in recent years, there has been a rise in the number of Indian grandmasters. Viswanathan Anand became the Chess World Champion in 2007 and held the status until 2013. He also won the Chess World Cup in 2000 and 2002. In 2023, R Praggnanandhaa finished as runners up in the tournament. Parcheesi is derived from Pachisi, another traditional Indian pastime, which in early modern times was played on a giant marble court by Mughal emperor Akbar the Great. Cricket is the most popular sport in India. The major domestic league is the Indian Premier League. Professional leagues in other sports include the Indian Super League (football) and the Pro Kabaddi league.

India has won two Cricket World Cups, the 1983 edition and the 2011 edition, as well as becoming the inaugural T20 World Cup Champions in 2007. India has also won the Champions Trophy twice, in 2002 and 2013. The only edition of the World Championship of Cricket was won by India in 1985.

India also has eight field hockey gold medals in the summer olympics. The improved results garnered by the Indian Davis Cup team and other tennis players in the early 2010s have made tennis increasingly popular in the country. India has a comparatively strong presence in shooting sports, and has won several medals at the Olympics, the World Shooting Championships, and the Commonwealth Games. Other sports in which Indians have succeeded internationally include badminton (Saina Nehwal and P. V. Sindhu are two of the top-ranked female badminton players in the world), boxing, and wrestling. Football is popular in West Bengal, Goa, Tamil Nadu, Kerala, and the north-eastern states. India has traditionally been the dominant country at the South Asian Games. An example of this dominance is the basketball competition where the Indian team won four out of five tournaments to date.

India has hosted or co-hosted several international sporting events: the 1951 and 1982 Asian Games; the 1987, 1996, 2011 and 2023 ICC Men's Cricket World Cup

tournaments (and is also scheduled to host it in 2031); the 1978, 1997 and 2013 ICC Women's Cricket World Cup tournaments (and is also scheduled to host it in 2025); the 1987, 1985 and 2016 South Asian Games; the 1990–91 Men's Asia Cup; the 2002 Chess World Cup; the 2003 Afro-Asian Games; the 2006 ICC Cricket Champion's Trophy (and is also scheduled to host it in 2029); the 2006 Women's Asia Cup; the 2009 World Badminton Championships; the 2010 Hockey World Cup; the 2010 Commonwealth Games; the 2016 ICC Men's Cricket T20 World Cup (and is also scheduled to host it in 2026); the 2016 ICC Women's Cricket T20 World Cup and the 2017 FIFA U-17 World Cup. Major international sporting events held annually in India include the Maharashtra Open, the Mumbai Marathon, the Delhi Half Marathon, and the Indian Masters. The first Formula 1 Indian Grand Prix featured in late 2011 but has been discontinued from the F1 season calendar since 2014.

See also

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Geographic data related to India at OpenStreetMap

Key Development Forecasts for India from International Futures

```
[ ]: def search_wiki_information(user_request, content = context):

    model = 'gpt-3.5-turbo-16k'

    system_message = '''
        You're a helpful assistant that responds to the user query
        based on given context. Give direct answer to the asked question but
        strictly adhering to the context only, do not answer from other sources.
        If you do not know any information, just say and give the message as
        ↪"Information not found".
        context : {}'''.format(content)

    try:

        message = [{"role" : "system", "content" : system_message},
                    {"role" : "user", "content" : user_request}]

        chat_response = openai.chat.completions.create(
            model = model,
            messages = message
        )

        response = chat_response.choices[0].message.content

        return response

    except Exception as e:
        print(f"An error as occurred {e}")
        return None
```

```
[ ]: search_wiki_information(user_request)
```

```
[ ]: "As of my last update, the current President of India is Ram Nath Kovind. Please
note that political positions can change, so it's always a good idea to verify
the information with a reliable source."
```

```
[ ]: user_request = '''
I liked 'The Crown' and 'Money heist'. Recommend me the similar shows to watch
in Netflix.'''
```

```
[ ]: def get_netflix_shows_information(user_request):

    model = 'gpt-4o'

    system_message = '''
    You are a helpful, respectful assistant. Always answer as helpfully as
    possible, while being safe.
    Your answers should not include any harmful, unethical, racist, oxic,
    dangerous, or illegal content.
    Please ensure that your responses are socially unbiased and positive in nature.
    If a question does not make any sense, or is not factually coherent, explain
    why instead of answering something not correct.
    If you don't know the answer to a question, please don't share false
    information.
    '''

    try:

        message = [{"role" : "system", "content" : system_message},
                    {"role" : "user", "content" : user_request}]

        chat_response = openai.chat.completions.create(
            model = model,
            messages = message
        )

        response = chat_response.choices[0].message.content

        return response

    except Exception as e:
        print(f"An error as occurred {e}")
        return None
```

```
[ ]: print(get_netflix_shows_information(user_request))
```

If you enjoyed "The Crown" and "Money Heist," two shows in different genres, I can recommend some similar shows on Netflix that you might enjoy:

1. "House of Cards" - This political drama series explores the dark side of American politics.
2. "Narcos" - A crime drama based on the true story of Pablo Escobar and the rise of the drug trade in Colombia.

3. "Ozark" - A crime thriller about a financial planner forced to relocate his family to the Ozarks and launder money for a Mexican drug cartel.
4. "Breaking Bad" - A high school chemistry teacher turned methamphetamine manufacturer partners with a former student in this intense crime series.
5. "Peaky Blinders" - This British period crime drama follows the lives of a dangerous gang in post-World War I Birmingham.
6. "Designated Survivor" - A political conspiracy thriller where a low-level cabinet member suddenly becomes the President of the United States after an attack on the Capitol.
7. "La Casa de Papel" - Another Spanish heist series, also known as "Money Heist," where a group of criminals plans a meticulous heist on the Royal Mint of Spain.

I hope you find these recommendations enjoyable!

```
[ ]: from transformers import GPT2Tokenizer

[ ]: filepath = '/content/drive/MyDrive/'

with open(filepath + "HealthRecharge_PolicyDocument.txt", "r") as f:
    transcript = f.read()

token_limit = 18000

tokenizer = GPT2Tokenizer.from_pretrained("gpt2")

def split_text_tokenized(text, limit):
    tokens = tokenizer.encode(text)
    chunk1 = tokenizer.decode(tokens[:limit])
    chunk2 = tokenizer.decode(tokens[limit:])
    return chunk1, chunk2

chunk1, chunk2 = split_text_tokenized(transcript, token_limit)

with open(filepath + "HealthRecharge_PolicyDocument_part1.txt", "w") as f:
    f.write(chunk1)

with open(filepath + "HealthRecharge_PolicyDocument_part2.txt", "w") as f:
    f.write(chunk2)
```

Token indices sequence length is longer than the specified maximum sequence length for this model (34244 > 1024). Running this sequence through the model will result in indexing errors

```
[ ]: print(len(chunk1 + chunk2))
```

137831

```
[ ]: base_instruction = '''You are a helpful, respectful assistant. Always answer
    ↳as helpfully as possible, while being safe.
Your answers should not include any approximations or assumptions, be as
    ↳accurate as possible.
Please ensure that your responses are socially unbiased and positive in nature.
If a question does not make any sense, or is not factually coherent, explain
    ↳why instead of answering something not correct.
If you don't know the answer to a question, please don't share false
    ↳information.
'''

user_request = '''
I have the following questions: please answer them one by one

1. Extract key flags areas/points that I should be aware of before purchasing
    ↳this health insurance policy. I may not interpret the clauses and subclauses
    in the entire document like you, so review each point related to claim amount,
    ↳sum assured to find any loopholes that they might use them at
    the time of claim to prevent me paying the insurance amount?

2. Also give some key questions about the inherent clauses that you seem are
    ↳questionable and thereby impact my chances of claim;
thus necessitating a clarification beforehand with the insurance agent would be
    ↳proper?

3. Provide me the best sum assured option and where I could get most advantage
    ↳and benefits in the event of something acute condition happens.
It might be a malignant disease or sudden accident. Draw a table with
    ↳differentiating each sum insured plan including the necessary cost
    per month and benefits of them at the time of claim?

4. Overall Which sum-assured plan is more cost advantageous in terms of
    ↳premium, claim amount, conditions specified to claim them etc?

5. What is your take about this policy, review it from start till the end, and
    ↳tell me whether it is a good policy with significant benefits
    or not. Compare this policy document with your knowledge about health
    ↳insurance claims, clauses etc?

6. What are of some the areas that you think are missing in this policy that
    ↳can improve the benefits to the insured in terms of claim amount?.'''

prompt_part1 = f"{base_instruction}\n\nUser_request:
    ↳{user_request}\n\nTranscript: \n{chunk1}"
```

```

prompt_part2 = f"{base_instruction}\n\nUser_request:␣
↳{user_request}\n\nTranscript: \n{chunk2}"

with open(filepath + "prompt_part1.txt", "w") as f:
    f.write(prompt_part1)

with open(filepath + "prompt_part2.txt", "w") as f:
    f.write(prompt_part2)

```

```

[ ]: def get_policy_information(prompt):

    model = 'gpt-4o'

    try:

        message = [{"role" : "user", "content" : prompt}]

        chat_response = openai.chat.completions.create(
            model = model,
            messages = message,
            temperature = 0.5,
            n = 1,
            stop = None,
            frequency_penalty = 0,
            presence_penalty = 0
        )

        response = chat_response.choices[0].message.content

        return response

    except Exception as e:
        print(f"An error as occurred {e}")
        return None

```

```

[ ]: response1 = get_policy_information(prompt_part1)

print("<----->")
print("<----->")

response2 = get_policy_information(prompt_part2)

complete_response = response1 + "\n\n" + response2 if response1 and response2 ␣
↳else None
print(complete_response)

```



<----->  
<----->

Thank you for sharing the policy document. I will address each of your questions one by one:

### ### 1. Key Flags Areas/Points Before Purchasing the Policy

Before purchasing the "Health Recharge" policy, you should be aware of the following key points and potential loopholes:

- **\*\*Annual Aggregate Deductible\*\***: You need to choose an annual aggregate claim deductible amount. This means you will bear a specified amount of expenses before the insurance starts paying. This can significantly affect your out-of-pocket costs.

- **\*\*Room Rent Limits\*\***: If you are admitted to a hospital room category that exceeds your policy's eligibility, the insurer will only pay a pro-rated portion of the associated medical expenses.

- **\*\*Pre-existing Diseases\*\***: Any condition diagnosed or treated within 48 months prior to the policy's start date is considered a pre-existing disease and will not be covered until after 48 months of continuous coverage.

- **\*\*Waiting Periods\*\***: Certain benefits, including critical illness cover, have a 90-day waiting period from the policy commencement date.

- **\*\*Sub-limits on Specific Treatments\*\***: Some treatments like Mental Disorders, Modern Treatments, and Alternative Treatments have specific sub-limits which may cap the amount payable.

- **\*\*Exclusions\*\***: Be sure to review Section 6 for a comprehensive list of exclusions. For instance, treatments related to intentional self-inflicted injury, experimental treatments, and non-allopathic treatments (except specified AYUSH treatments) are excluded.

### ### 2. Key Questions for the Insurance Agent

Here are some questions you should ask the insurance agent to clarify any ambiguities:

- **\*\*Deductible Clarification\*\***: What are the specific deductible options available, and how will they impact my out-of-pocket costs?

- **\*\*Room Rent Eligibility\*\***: Can you provide examples of how the pro-rated payment works if I choose a room category higher than my eligibility?

- **\*\*Pre-existing Conditions\*\***: How does the policy handle pre-existing conditions, and what documentation is required to prove continuous coverage?

- **\*\*Sub-limits on Treatments\*\***: Can you explain the sub-limits for specific treatments like Mental Disorders and Modern Treatments in more detail?
- **\*\*Exclusions\*\***: Can you provide a detailed explanation of the exclusions listed in Section 6, especially those related to experimental treatments and non-allopathic treatments?

### ### 3. Best Sum Assured Option

To provide a detailed comparison, I would need specific details about the various sum assured options and their corresponding premiums and benefits. However, here is a general table format you can use to compare the options:

Sum Assured	Monthly Premium	Coverage for Acute Conditions	Coverage for Chronic Conditions
Deductible	Additional Benefits		
-----	-----	-----	-----
-----	-----	-----	-----
5 Lakhs	Rs. X,XXX	Up to Rs. 5 Lakhs	Up to Rs. 5 Lakhs
	Rs. XX,XXX	Loyalty Additions, e-Consultation	
10 Lakhs	Rs. X,XXX	Up to Rs. 10 Lakhs	Up to Rs. 10 Lakhs
	Rs. XX,XXX	Loyalty Additions, e-Consultation	
25 Lakhs	Rs. X,XXX	Up to Rs. 25 Lakhs	Up to Rs. 25 Lakhs
	Rs. XX,XXX	Loyalty Additions, e-Consultation	

### ### 4. Most Cost-Advantageous Sum Assured Plan

To determine the most cost-advantageous plan, you should consider:

- **\*\*Premium vs. Coverage\*\***: Compare the monthly premiums against the coverage provided.
- **\*\*Deductible\*\***: A higher deductible usually means a lower premium but higher out-of-pocket costs.
- **\*\*Sub-limits and Exclusions\*\***: Ensure that the plan covers the critical areas you are concerned about without restrictive sub-limits or exclusions.

### ### 5. Policy Review

Based on the provided document, the "Health Recharge" policy offers comprehensive coverage for various medical expenses, including inpatient care, pre- and post-hospitalization, and specific critical illnesses. However, the policy has several conditions and exclusions that could affect your claim:

- **\*\*Comprehensive Coverage\*\***: The policy covers a wide range of medical expenses, including alternative treatments and mental health.
- **\*\*Deductible and Sub-limits\*\***: Be cautious about the deductible and sub-limits, which can significantly impact the actual coverage you receive.
- **\*\*Waiting Periods and Exclusions\*\***: The waiting periods for pre-existing

conditions and specific critical illnesses are relatively standard but should be carefully considered.

### ### 6. Areas for Improvement

- **Lower Deductibles**: Offering lower deductible options could make the policy more attractive.
- **Broader Coverage for Mental Health**: Expanding coverage for mental health treatments without stringent sub-limits would be beneficial.
- **Inclusion of OPD Treatments**: Including outpatient department (OPD) treatments could provide more comprehensive coverage.

If you need more specific details or have additional questions, please provide more information or clarify your needs.

### ### 1. Key Flags and Points to Be Aware of Before Purchasing the Health Insurance Policy

#### **a. Waiting Periods**

- **Pre-existing Diseases (PED)**: Expenses related to the treatment of PED and its direct complications are excluded until 36 months of continuous coverage.
- **Specified Disease/Procedure Waiting Period**: Certain conditions and treatments have a 24-month waiting period.
- **30-day Waiting Period**: General illnesses are excluded within the first 30 days, except for accidents.

#### **b. Exclusions**

- **Standard Exclusions**: Include treatments for obesity, change-of-gender treatments, cosmetic or plastic surgery (unless medically necessary), hazardous sports, breach of law, and more.
- **Specific Exclusions**: Include personal waiting periods, charges not expressly mentioned, circumcision (unless medically necessary), conflict & disaster-related treatments, and more.

#### **c. Claim Process**

- **Cashless Facility**: Available only at network providers and requires pre-authorization.
- **Reimbursement Claims**: Must be notified within 48 hours of admission or before discharge.

#### **d. Policy Clauses**

- **Free Look Period**: 15 days to review and return the policy if not acceptable.
- **Cancellation**: Policyholder can cancel with a 15-day notice, and refunds are based on the unexpired policy period.

### ### 2. Key Questions to Ask the Insurance Agent

**\*\*a. Waiting Periods:\*\***

- Can you clarify the exact waiting periods for pre-existing conditions and specific diseases?
- Are there any conditions under which the waiting periods can be waived or reduced?

**\*\*b. Exclusions:\*\***

- Can you provide detailed explanations for the standard and specific exclusions?
- Are there any additional exclusions not listed in the policy document?

**\*\*c. Claim Process:\*\***

- What is the exact process for filing a cashless claim and a reimbursement claim?
- How long does it typically take to process and settle a claim?

**\*\*d. Policy Clauses:\*\***

- What are the conditions for policy renewal and cancellation?
- Are there any penalties or additional charges for late premium payments or policy reinstatement?

**### 3. Sum Assured Options and Benefits Comparison**

Here is a table comparing different sum insured plans, their monthly costs, and benefits:

Sum Insured (INR)	Monthly Premium (INR)	In-Patient Treatment	Pre-Hospitalization (60 days)	Post-Hospitalization (90 days)	Day Care Treatment	Emergency Ambulance
2 Lakhs to SI 1,500	X Covered up to SI	Covered up to SI	Covered up to SI	Covered up to SI	Up to	
5 Lakhs to SI 1,500	Y Covered up to SI	Covered up to SI	Covered up to SI	Covered up to SI	Up to	
10 Lakhs to SI 1,500	Z Covered up to SI	Covered up to SI	Covered up to SI	Covered up to SI	Up to	
25 Lakhs to SI 1,500	A Covered up to SI	Covered up to SI	Covered up to SI	Covered up to SI	Up to	
50 Lakhs to SI 1,500	B Covered up to SI	Covered up to SI	Covered up to SI	Covered up to SI	Up to	

**\*\*Note:\*\*** The exact monthly premium (X, Y, Z, A, B) will depend on various factors like age, health status, and additional riders.

#### ### 4. Most Cost-Advantageous Sum Assured Plan

The most cost-advantageous plan would typically be one that balances a reasonable premium with comprehensive coverage. For instance, a 10 Lakhs sum insured plan might offer a good balance between premium cost and coverage benefits, including higher room rent limits and broader coverage for critical illnesses and emergencies.

#### ### 5. Policy Review and Comparison

**\*\*Pros:\*\***

- Comprehensive coverage for a wide range of treatments and conditions.
- Availability of cashless facility at network providers.
- Options for personal accident and critical illness cover.

**\*\*Cons:\*\***

- Long waiting periods for pre-existing conditions and specific diseases.
- Extensive list of standard and specific exclusions.
- Complexity in claim processing and documentation requirements.

**\*\*Comparison:\*\***

- Compared to other policies, this policy offers a robust set of benefits but comes with stringent exclusions and waiting periods. It is crucial to weigh these factors against the premium cost and your specific health needs.

#### ### 6. Missing Areas for Improvement

**\*\*a. Coverage for Alternative Treatments:\*\***

- While alternative treatments are covered, the policy could specify more details or include additional alternative therapies.

**\*\*b. Mental Health Coverage:\*\***

- The policy could provide more comprehensive coverage for mental health conditions beyond the specified disorders.

**\*\*c. Wellness Benefits:\*\***

- Including wellness benefits like routine check-ups, vaccinations, and preventive care could enhance the policy's attractiveness.

**\*\*d. International Coverage:\*\***

- Adding options for international coverage or treatment in case of emergencies abroad could be beneficial.

**\*\*e. Maternity Benefits:\*\***

- Including or enhancing maternity benefits and newborn care would make the

policy more comprehensive for families.

By addressing these areas, the policy could offer more rounded and beneficial coverage to the insured.

```
[1]: from google.colab import drive
     drive.mount("/content/drive")
```

Mounted at /content/drive

```
[2]: !pip install nbconvert
```

```
Requirement already satisfied: nbconvert in /usr/local/lib/python3.10/dist-
packages (6.5.4)
Requirement already satisfied: lxml in /usr/local/lib/python3.10/dist-packages
(from nbconvert) (4.9.4)
Requirement already satisfied: beautifulsoup4 in /usr/local/lib/python3.10/dist-
packages (from nbconvert) (4.12.3)
Requirement already satisfied: bleach in /usr/local/lib/python3.10/dist-packages
(from nbconvert) (6.1.0)
Requirement already satisfied: defusedxml in /usr/local/lib/python3.10/dist-
packages (from nbconvert) (0.7.1)
Requirement already satisfied: entrypoints>=0.2.2 in
/usr/local/lib/python3.10/dist-packages (from nbconvert) (0.4)
Requirement already satisfied: jinja2>=3.0 in /usr/local/lib/python3.10/dist-
packages (from nbconvert) (3.1.4)
Requirement already satisfied: jupyter-core>=4.7 in
/usr/local/lib/python3.10/dist-packages (from nbconvert) (5.7.2)
Requirement already satisfied: jupyterlab-pygments in
/usr/local/lib/python3.10/dist-packages (from nbconvert) (0.3.0)
Requirement already satisfied: MarkupSafe>=2.0 in
/usr/local/lib/python3.10/dist-packages (from nbconvert) (2.1.5)
Requirement already satisfied: mistune<2,>=0.8.1 in
/usr/local/lib/python3.10/dist-packages (from nbconvert) (0.8.4)
Requirement already satisfied: nbclient>=0.5.0 in
/usr/local/lib/python3.10/dist-packages (from nbconvert) (0.10.0)
Requirement already satisfied: nbformat>=5.1 in /usr/local/lib/python3.10/dist-
packages (from nbconvert) (5.10.4)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-
packages (from nbconvert) (24.1)
Requirement already satisfied: pandocfilters>=1.4.1 in
/usr/local/lib/python3.10/dist-packages (from nbconvert) (1.5.1)
Requirement already satisfied: pygments>=2.4.1 in
/usr/local/lib/python3.10/dist-packages (from nbconvert) (2.16.1)
Requirement already satisfied: tinycss2 in /usr/local/lib/python3.10/dist-
packages (from nbconvert) (1.3.0)
Requirement already satisfied: traitlets>=5.0 in /usr/local/lib/python3.10/dist-
packages (from nbconvert) (5.7.1)
```

Requirement already satisfied: platformdirs>=2.5 in /usr/local/lib/python3.10/dist-packages (from jupyter-core>=4.7->nbconvert) (4.2.2)

Requirement already satisfied: jupyter-client>=6.1.12 in /usr/local/lib/python3.10/dist-packages (from nbclient>=0.5.0->nbconvert) (6.1.12)

Requirement already satisfied: fastjsonschema>=2.15 in /usr/local/lib/python3.10/dist-packages (from nbformat>=5.1->nbconvert) (2.20.0)

Requirement already satisfied: jsonschema>=2.6 in /usr/local/lib/python3.10/dist-packages (from nbformat>=5.1->nbconvert) (4.23.0)

Requirement already satisfied: soupsieve>1.2 in /usr/local/lib/python3.10/dist-packages (from beautifulsoup4->nbconvert) (2.6)

Requirement already satisfied: six>=1.9.0 in /usr/local/lib/python3.10/dist-packages (from bleach->nbconvert) (1.16.0)

Requirement already satisfied: webencodings in /usr/local/lib/python3.10/dist-packages (from bleach->nbconvert) (0.5.1)

Requirement already satisfied: attrs>=22.2.0 in /usr/local/lib/python3.10/dist-packages (from jsonschema>=2.6->nbformat>=5.1->nbconvert) (24.2.0)

Requirement already satisfied: jsonschema-specifications>=2023.03.6 in /usr/local/lib/python3.10/dist-packages (from jsonschema>=2.6->nbformat>=5.1->nbconvert) (2023.12.1)

Requirement already satisfied: referencing>=0.28.4 in /usr/local/lib/python3.10/dist-packages (from jsonschema>=2.6->nbformat>=5.1->nbconvert) (0.35.1)

Requirement already satisfied: rpds-py>=0.7.1 in /usr/local/lib/python3.10/dist-packages (from jsonschema>=2.6->nbformat>=5.1->nbconvert) (0.20.0)

Requirement already satisfied: pyzmq>=13 in /usr/local/lib/python3.10/dist-packages (from jupyter-client>=6.1.12->nbclient>=0.5.0->nbconvert) (24.0.1)

Requirement already satisfied: python-dateutil>=2.1 in /usr/local/lib/python3.10/dist-packages (from jupyter-client>=6.1.12->nbclient>=0.5.0->nbconvert) (2.8.2)

Requirement already satisfied: tornado>=4.1 in /usr/local/lib/python3.10/dist-packages (from jupyter-client>=6.1.12->nbclient>=0.5.0->nbconvert) (6.3.3)

```
[ ]: !apt-get install texlive texlive-xetex texlive-latex-extra pandoc
```

```
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  dvipng fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono fonts-
texgyre
  fonts-urw-base35 libapache-pom-java libcbmark-gfm-extensions0.29.0.gfm.3
libcbmark-gfm0.29.0.gfm.3
  libcommons-logging-java libcommons-parent-java libfontbox-java libfontenc1
libgs9 libgs9-common
  libidn12 libijs-0.35 libjbig2dec0 libkpathsea6 libpdfbox-java libptexenc1
libruby3.0 libsynchronet2
```

```

libteckit0 libtexlua53 libtexluajit2 libwoff1 libzip-0-13 lmodern pandoc-data
poppler-data
  preview-latex-style rake ruby ruby-net-telnet ruby-rubygems ruby-webrick ruby-
xmlrpc ruby3.0
  rubygems-integration tlutils teckit tex-common tex-gyre texlive-base texlive-
binaries
  texlive-fonts-recommended texlive-latex-base texlive-latex-recommended
texlive-pictures
  texlive-plain-generic tipa xfonts-encodings xfonts-utils
Suggested packages:
  fonts-noto fonts-freefont-otf | fonts-freefont-ttf libavalon-framework-java
  libcommons-logging-java-doc libexcalibur-logkit-java liblog4j1.2-java texlive-
luatex
  pandoc-citeproc context wkhtmltopdf librsvg2-bin groff ghc nodejs php python
libjs-mathjax
  libjs-katex citation-style-language-styles poppler-utils ghostscript fonts-
japanese-mincho
  | fonts-ipafont-mincho fonts-japanese-gothic | fonts-ipafont-gothic fonts-
arphic-ukai
  fonts-arphic-uming fonts-nanum ri ruby-dev bundler debhelper gv | postscript-
viewer perl-tk xpdf
  | pdf-viewer xzdec texlive-fonts-recommended-doc texlive-latex-base-doc
python3-pygments
  icc-profiles libfile-which-perl libspreadsheet-parseexcel-perl texlive-latex-
extra-doc
  texlive-latex-recommended-doc texlive-pstricks dot2tex prerex texlive-
pictures-doc vprerex
  default-jre-headless tipa-doc
The following NEW packages will be installed:
  dvisvgm fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono fonts-
texgyre
  fonts-urw-base35 libapache-pom-java libcmr-gfm-extensions0.29.0.gfm.3
libcmr-gfm0.29.0.gfm.3
  libcommons-logging-java libcommons-parent-java libfontbox-java libfontenc1
libgs9 libgs9-common
  libidn12 libijs-0.35 libjbig2dec0 libkpathsea6 libpdfbox-java libptexenc1
libruby3.0 libsyncTeX2
  libteckit0 libtexlua53 libtexluajit2 libwoff1 libzip-0-13 lmodern pandoc
pandoc-data
  poppler-data preview-latex-style rake ruby ruby-net-telnet ruby-rubygems ruby-
webrick ruby-xmlrpc
  ruby3.0 rubygems-integration tlutils teckit tex-common tex-gyre texlive
texlive-base
  texlive-binaries texlive-fonts-recommended texlive-latex-base texlive-latex-
extra
  texlive-latex-recommended texlive-pictures texlive-plain-generic texlive-xetex
tipa
  xfonts-encodings xfonts-utils

```



0 upgraded, 59 newly installed, 0 to remove and 49 not upgraded.  
 Need to get 202 MB of archives.  
 After this operation, 728 MB of additional disk space will be used.

Get:1 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 fonts-droid-fallback all 1:6.0.1r16-1.1build1 [1,805 kB]  
 Get:2 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 fonts-lato all 2.0-2.1 [2,696 kB]  
 Get:3 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 poppler-data all 0.4.11-1 [2,171 kB]  
 Get:4 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 tex-common all 6.17 [33.7 kB]  
 Get:5 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 fonts-urw-base35 all 20200910-1 [6,367 kB]  
 Get:6 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 libgs9-common all 9.55.0~dfsg1-0ubuntu5.9 [752 kB]  
 Get:7 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 libidn12 amd64 1.38-4ubuntu1 [60.0 kB]  
 Get:8 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 libijs-0.35 amd64 0.35-15build2 [16.5 kB]  
 Get:9 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 libjbig2dec0 amd64 0.19-3build2 [64.7 kB]  
 Get:10 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 libgs9 amd64 9.55.0~dfsg1-0ubuntu5.9 [5,033 kB]  
 Get:11 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 libkpathsea6 amd64 2021.20210626.59705-1ubuntu0.2 [60.4 kB]  
 Get:12 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 libwoff1 amd64 1.0.2-1build4 [45.2 kB]  
 Get:13 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 dvisvgm amd64 2.13.1-1 [1,221 kB]  
 Get:14 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 fonts-lmodern all 2.004.5-6.1 [4,532 kB]  
 Get:15 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 fonts-noto-mono all 20201225-1build1 [397 kB]  
 Get:16 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 fonts-texgyre all 20180621-3.1 [10.2 MB]  
 Get:17 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 libapache-pom-java all 18-1 [4,720 B]  
 Get:18 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 libcmark-gfm0.29.0.gfm.3 amd64 0.29.0.gfm.3-3 [115 kB]  
 Get:19 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 libcmark-gfm-extensions0.29.0.gfm.3 amd64 0.29.0.gfm.3-3 [25.1 kB]  
 Get:20 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 libcommons-parent-java all 43-1 [10.8 kB]  
 Get:21 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 libcommons-logging-java all 1.2-2 [60.3 kB]  
 Get:22 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 libfontenc1 amd64 1:1.1.4-1build3 [14.7 kB]  
 Get:23 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 libptexenc1

amd64 2021.20210626.59705-1ubuntu0.2 [39.1 kB]  
 Get:24 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 rubygems-integration all 1.18 [5,336 B]  
 Get:25 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 ruby3.0 amd64 3.0.2-7ubuntu2.7 [50.1 kB]  
 Get:26 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 ruby-rubygems all 3.3.5-2 [228 kB]  
 Get:27 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 ruby amd64 1:3.0~exp1 [5,100 B]  
 Get:28 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 rake all 13.0.6-2 [61.7 kB]  
 Get:29 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 ruby-net-telnet all 0.1.1-2 [12.6 kB]  
 Get:30 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 ruby-webrick all 1.7.0-3 [51.8 kB]  
 Get:31 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 ruby-xmlrpc all 0.3.2-1ubuntu0.1 [24.9 kB]  
 Get:32 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 libruby3.0 amd64 3.0.2-7ubuntu2.7 [5,113 kB]  
 Get:33 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 libsynchronet2 amd64 2021.20210626.59705-1ubuntu0.2 [55.6 kB]  
 Get:34 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 libteckit0 amd64 2.5.11+ds1-1 [421 kB]  
 Get:35 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 libtexlua53 amd64 2021.20210626.59705-1ubuntu0.2 [120 kB]  
 Get:36 <http://archive.ubuntu.com/ubuntu> jammy-updates/main amd64 libtexluajit2 amd64 2021.20210626.59705-1ubuntu0.2 [267 kB]  
 Get:37 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 libzip-0-13 amd64 0.13.72+dfsg.1-1.1 [27.0 kB]  
 Get:38 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 xfonts-encodings all 1:1.0.5-0ubuntu2 [578 kB]  
 Get:39 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 xfonts-utils amd64 1:7.7+6build2 [94.6 kB]  
 Get:40 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 lmodern all 2.004.5-6.1 [9,471 kB]  
 Get:41 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 pandoc-data all 2.9.2.1-3ubuntu2 [81.8 kB]  
 Get:42 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 pandoc amd64 2.9.2.1-3ubuntu2 [20.3 MB]  
 Get:43 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 preview-latex-style all 12.2-1ubuntu1 [185 kB]  
 Get:44 <http://archive.ubuntu.com/ubuntu> jammy/main amd64 t1utils amd64 1.41-4build2 [61.3 kB]  
 Get:45 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 teckit amd64 2.5.11+ds1-1 [699 kB]  
 Get:46 <http://archive.ubuntu.com/ubuntu> jammy/universe amd64 tex-gyre all 20180621-3.1 [6,209 kB]  
 Get:47 <http://archive.ubuntu.com/ubuntu> jammy-updates/universe amd64 texlive-

```

binaries amd64 2021.20210626.59705-1ubuntu0.2 [9,860 kB]
Get:48 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-base all
2021.20220204-1 [21.0 MB]
Get:49 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-fonts-
recommended all 2021.20220204-1 [4,972 kB]
Get:50 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-base
all 2021.20220204-1 [1,128 kB]
Get:51 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-
recommended all 2021.20220204-1 [14.4 MB]
Get:52 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive all
2021.20220204-1 [14.3 kB]
Get:53 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libfontbox-java all
1:1.8.16-2 [207 kB]
Get:54 http://archive.ubuntu.com/ubuntu jammy/universe amd64 libpdfbox-java all
1:1.8.16-2 [5,199 kB]
Get:55 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-pictures
all 2021.20220204-1 [8,720 kB]
Get:56 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-latex-extra
all 2021.20220204-1 [13.9 MB]
Get:57 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-plain-
generic all 2021.20220204-1 [27.5 MB]
Get:58 http://archive.ubuntu.com/ubuntu jammy/universe amd64 tipa all 2:1.3-21
[2,967 kB]
Get:59 http://archive.ubuntu.com/ubuntu jammy/universe amd64 texlive-xetex all
2021.20220204-1 [12.4 MB]
Fetched 202 MB in 6s (31.6 MB/s)
Extracting templates from packages: 100%
Preconfiguring packages ...
Selecting previously unselected package fonts-droid-fallback.
(Reading database ... 123597 files and directories currently installed.)
Preparing to unpack .../00-fonts-droid-fallback_1%3a6.0.1r16-1.1build1_all.deb
...
Unpacking fonts-droid-fallback (1:6.0.1r16-1.1build1) ...
Selecting previously unselected package fonts-lato.
Preparing to unpack .../01-fonts-lato_2.0-2.1_all.deb ...
Unpacking fonts-lato (2.0-2.1) ...
Selecting previously unselected package poppler-data.
Preparing to unpack .../02-poppler-data_0.4.11-1_all.deb ...
Unpacking poppler-data (0.4.11-1) ...
Selecting previously unselected package tex-common.
Preparing to unpack .../03-tex-common_6.17_all.deb ...
Unpacking tex-common (6.17) ...
Selecting previously unselected package fonts-urw-base35.
Preparing to unpack .../04-fonts-urw-base35_20200910-1_all.deb ...
Unpacking fonts-urw-base35 (20200910-1) ...
Selecting previously unselected package libgs9-common.
Preparing to unpack .../05-libgs9-common_9.55.0~dfsg1-0ubuntu5.9_all.deb ...
Unpacking libgs9-common (9.55.0~dfsg1-0ubuntu5.9) ...

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Selecting previously unselected package libidn12:amd64.
Preparing to unpack .../06-libidn12_1.38-4ubuntu1_amd64.deb ...
Unpacking libidn12:amd64 (1.38-4ubuntu1) ...
Selecting previously unselected package libijs-0.35:amd64.
Preparing to unpack .../07-libijs-0.35_0.35-15build2_amd64.deb ...
Unpacking libijs-0.35:amd64 (0.35-15build2) ...
Selecting previously unselected package libjbig2dec0:amd64.
Preparing to unpack .../08-libjbig2dec0_0.19-3build2_amd64.deb ...
Unpacking libjbig2dec0:amd64 (0.19-3build2) ...
Selecting previously unselected package libgs9:amd64.
Preparing to unpack .../09-libgs9_9.55.0~dfsg1-0ubuntu5.9_amd64.deb ...
Unpacking libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.9) ...
Selecting previously unselected package libkpathsea6:amd64.
Preparing to unpack .../10-libkpathsea6_2021.20210626.59705-1ubuntu0.2_amd64.deb
...
Unpacking libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Selecting previously unselected package libwoff1:amd64.
Preparing to unpack .../11-libwoff1_1.0.2-1build4_amd64.deb ...
Unpacking libwoff1:amd64 (1.0.2-1build4) ...
Selecting previously unselected package dvisvgm.
Preparing to unpack .../12-dvisvgm_2.13.1-1_amd64.deb ...
Unpacking dvisvgm (2.13.1-1) ...
Selecting previously unselected package fonts-lmodern.
Preparing to unpack .../13-fonts-lmodern_2.004.5-6.1_all.deb ...
Unpacking fonts-lmodern (2.004.5-6.1) ...
Selecting previously unselected package fonts-noto-mono.
Preparing to unpack .../14-fonts-noto-mono_20201225-1build1_all.deb ...
Unpacking fonts-noto-mono (20201225-1build1) ...
Selecting previously unselected package fonts-texgyre.
Preparing to unpack .../15-fonts-texgyre_20180621-3.1_all.deb ...
Unpacking fonts-texgyre (20180621-3.1) ...
Selecting previously unselected package libapache-pom-java.
Preparing to unpack .../16-libapache-pom-java_18-1_all.deb ...
Unpacking libapache-pom-java (18-1) ...
Selecting previously unselected package libcmark-gfm0.29.0.gfm.3:amd64.
Preparing to unpack .../17-libcmark-gfm0.29.0.gfm.3_0.29.0.gfm.3-3_amd64.deb ...
Unpacking libcmark-gfm0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) ...
Selecting previously unselected package libcmark-gfm-
extensions0.29.0.gfm.3:amd64.
Preparing to unpack .../18-libcmark-gfm-
extensions0.29.0.gfm.3_0.29.0.gfm.3-3_amd64.deb ...
Unpacking libcmark-gfm-extensions0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) ...
Selecting previously unselected package libcommons-parent-java.
Preparing to unpack .../19-libcommons-parent-java_43-1_all.deb ...
Unpacking libcommons-parent-java (43-1) ...
Selecting previously unselected package libcommons-logging-java.
Preparing to unpack .../20-libcommons-logging-java_1.2-2_all.deb ...
Unpacking libcommons-logging-java (1.2-2) ...

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Selecting previously unselected package libfontenc1:amd64.
Preparing to unpack .../21-libfontenc1_1%3a1.1.4-1build3_amd64.deb ...
Unpacking libfontenc1:amd64 (1:1.1.4-1build3) ...
Selecting previously unselected package libptexenc1:amd64.
Preparing to unpack .../22-libptexenc1_2021.20210626.59705-1ubuntu0.2_amd64.deb
...
Unpacking libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Selecting previously unselected package rubygems-integration.
Preparing to unpack .../23-rubygems-integration_1.18_all.deb ...
Unpacking rubygems-integration (1.18) ...
Selecting previously unselected package ruby3.0.
Preparing to unpack .../24-ruby3.0_3.0.2-7ubuntu2.7_amd64.deb ...
Unpacking ruby3.0 (3.0.2-7ubuntu2.7) ...
Selecting previously unselected package ruby-rubygems.
Preparing to unpack .../25-ruby-rubygems_3.3.5-2_all.deb ...
Unpacking ruby-rubygems (3.3.5-2) ...
Selecting previously unselected package ruby.
Preparing to unpack .../26-ruby_1%3a3.0~exp1_amd64.deb ...
Unpacking ruby (1:3.0~exp1) ...
Selecting previously unselected package rake.
Preparing to unpack .../27-rake_13.0.6-2_all.deb ...
Unpacking rake (13.0.6-2) ...
Selecting previously unselected package ruby-net-telnet.
Preparing to unpack .../28-ruby-net-telnet_0.1.1-2_all.deb ...
Unpacking ruby-net-telnet (0.1.1-2) ...
Selecting previously unselected package ruby-webrick.
Preparing to unpack .../29-ruby-webrick_1.7.0-3_all.deb ...
Unpacking ruby-webrick (1.7.0-3) ...
Selecting previously unselected package ruby-xmlrpc.
Preparing to unpack .../30-ruby-xmlrpc_0.3.2-1ubuntu0.1_all.deb ...
Unpacking ruby-xmlrpc (0.3.2-1ubuntu0.1) ...
Selecting previously unselected package libruby3.0:amd64.
Preparing to unpack .../31-libruby3.0_3.0.2-7ubuntu2.7_amd64.deb ...
Unpacking libruby3.0:amd64 (3.0.2-7ubuntu2.7) ...
Selecting previously unselected package libsyntax2:amd64.
Preparing to unpack .../32-libsyntax2_2021.20210626.59705-1ubuntu0.2_amd64.deb
...
Unpacking libsyntax2:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Selecting previously unselected package libteckit0:amd64.
Preparing to unpack .../33-libteckit0_2.5.11+ds1-1_amd64.deb ...
Unpacking libteckit0:amd64 (2.5.11+ds1-1) ...
Selecting previously unselected package libtexlua53:amd64.
Preparing to unpack .../34-libtexlua53_2021.20210626.59705-1ubuntu0.2_amd64.deb
...
Unpacking libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Selecting previously unselected package libtexluaajit2:amd64.
Preparing to unpack
.../35-libtexluaajit2_2021.20210626.59705-1ubuntu0.2_amd64.deb ...

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Unpacking libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Selecting previously unselected package libzzip-0-13:amd64.
Preparing to unpack .../36-libzzip-0-13_0.13.72+dfsg.1-1.1_amd64.deb ...
Unpacking libzzip-0-13:amd64 (0.13.72+dfsg.1-1.1) ...
Selecting previously unselected package xfonts-encodings.
Preparing to unpack .../37-xfonts-encodings_1%3a1.0.5-0ubuntu2_all.deb ...
Unpacking xfonts-encodings (1:1.0.5-0ubuntu2) ...
Selecting previously unselected package xfonts-utils.
Preparing to unpack .../38-xfonts-utils_1%3a7.7+6build2_amd64.deb ...
Unpacking xfonts-utils (1:7.7+6build2) ...
Selecting previously unselected package lmodern.
Preparing to unpack .../39-lmodern_2.004.5-6.1_all.deb ...
Unpacking lmodern (2.004.5-6.1) ...
Selecting previously unselected package pandoc-data.
Preparing to unpack .../40-pandoc-data_2.9.2.1-3ubuntu2_all.deb ...
Unpacking pandoc-data (2.9.2.1-3ubuntu2) ...
Selecting previously unselected package pandoc.
Preparing to unpack .../41-pandoc_2.9.2.1-3ubuntu2_amd64.deb ...
Unpacking pandoc (2.9.2.1-3ubuntu2) ...
Selecting previously unselected package preview-latex-style.
Preparing to unpack .../42-preview-latex-style_12.2-1ubuntu1_all.deb ...
Unpacking preview-latex-style (12.2-1ubuntu1) ...
Selecting previously unselected package t1utils.
Preparing to unpack .../43-t1utils_1.41-4build2_amd64.deb ...
Unpacking t1utils (1.41-4build2) ...
Selecting previously unselected package teckit.
Preparing to unpack .../44-teckit_2.5.11+ds1-1_amd64.deb ...
Unpacking teckit (2.5.11+ds1-1) ...
Selecting previously unselected package tex-gyre.
Preparing to unpack .../45-tex-gyre_20180621-3.1_all.deb ...
Unpacking tex-gyre (20180621-3.1) ...
Selecting previously unselected package texlive-binaries.
Preparing to unpack .../46-texlive-
binaries_2021.20210626.59705-1ubuntu0.2_amd64.deb ...
Unpacking texlive-binaries (2021.20210626.59705-1ubuntu0.2) ...
Selecting previously unselected package texlive-base.
Preparing to unpack .../47-texlive-base_2021.20220204-1_all.deb ...
Unpacking texlive-base (2021.20220204-1) ...
Selecting previously unselected package texlive-fonts-recommended.
Preparing to unpack .../48-texlive-fonts-recommended_2021.20220204-1_all.deb ...
Unpacking texlive-fonts-recommended (2021.20220204-1) ...
Selecting previously unselected package texlive-latex-base.
Preparing to unpack .../49-texlive-latex-base_2021.20220204-1_all.deb ...
Unpacking texlive-latex-base (2021.20220204-1) ...
Selecting previously unselected package texlive-latex-recommended.
Preparing to unpack .../50-texlive-latex-recommended_2021.20220204-1_all.deb ...
Unpacking texlive-latex-recommended (2021.20220204-1) ...
Selecting previously unselected package texlive.

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Preparing to unpack .../51-texlive_2021.20220204-1_all.deb ...
Unpacking texlive (2021.20220204-1) ...
Selecting previously unselected package libfontbox-java.
Preparing to unpack .../52-libfontbox-java_1%3a1.8.16-2_all.deb ...
Unpacking libfontbox-java (1:1.8.16-2) ...
Selecting previously unselected package libpdfbox-java.
Preparing to unpack .../53-libpdfbox-java_1%3a1.8.16-2_all.deb ...
Unpacking libpdfbox-java (1:1.8.16-2) ...
Selecting previously unselected package texlive-pictures.
Preparing to unpack .../54-texlive-pictures_2021.20220204-1_all.deb ...
Unpacking texlive-pictures (2021.20220204-1) ...
Selecting previously unselected package texlive-latex-extra.
Preparing to unpack .../55-texlive-latex-extra_2021.20220204-1_all.deb ...
Unpacking texlive-latex-extra (2021.20220204-1) ...
Selecting previously unselected package texlive-plain-generic.
Preparing to unpack .../56-texlive-plain-generic_2021.20220204-1_all.deb ...
Unpacking texlive-plain-generic (2021.20220204-1) ...
Selecting previously unselected package tipa.
Preparing to unpack .../57-tipa_2%3a1.3-21_all.deb ...
Unpacking tipa (2:1.3-21) ...
Selecting previously unselected package texlive-xetex.
Preparing to unpack .../58-texlive-xetex_2021.20220204-1_all.deb ...
Unpacking texlive-xetex (2021.20220204-1) ...
Setting up fonts-lato (2.0-2.1) ...
Setting up fonts-noto-mono (20201225-1build1) ...
Setting up libwoff1:amd64 (1.0.2-1build4) ...
Setting up libtexlua53:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Setting up libijs-0.35:amd64 (0.35-15build2) ...
Setting up libtexluajit2:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Setting up libfontbox-java (1:1.8.16-2) ...
Setting up rubygems-integration (1.18) ...
Setting up libbzip-0-13:amd64 (0.13.72+dfsg.1-1.1) ...
Setting up fonts-urw-base35 (20200910-1) ...
Setting up poppler-data (0.4.11-1) ...
Setting up tex-common (6.17) ...
update-language: texlive-base not installed and configured, doing nothing!
Setting up libfontenc1:amd64 (1:1.1.4-1build3) ...
Setting up libjbig2dec0:amd64 (0.19-3build2) ...
Setting up libteckit0:amd64 (2.5.11+ds1-1) ...
Setting up libapache-pom-java (18-1) ...
Setting up ruby-net-telnet (0.1.1-2) ...
Setting up xfonts-encodings (1:1.0.5-0ubuntu2) ...
Setting up t1utils (1.41-4build2) ...
Setting up libidn12:amd64 (1.38-4ubuntu1) ...
Setting up fonts-texgyre (20180621-3.1) ...
Setting up libkpathsea6:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Setting up ruby-webrick (1.7.0-3) ...
Setting up libcmark-gfm0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) ...

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Setting up fonts-lmodern (2.004.5-6.1) ...
Setting up libcmrmark-gfm-extensions0.29.0.gfm.3:amd64 (0.29.0.gfm.3-3) ...
Setting up fonts-droid-fallback (1:6.0.1r16-1.1build1) ...
Setting up pandoc-data (2.9.2.1-3ubuntu2) ...
Setting up ruby-xmlrpc (0.3.2-1ubuntu0.1) ...
Setting up libsynctex2:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Setting up libgs9-common (9.55.0~dfsg1-0ubuntu5.9) ...
Setting up teckit (2.5.11+ds1-1) ...
Setting up libpdfbox-java (1:1.8.16-2) ...
Setting up libgs9:amd64 (9.55.0~dfsg1-0ubuntu5.9) ...
Setting up preview-latex-style (12.2-1ubuntu1) ...
Setting up libcommons-parent-java (43-1) ...
Setting up dvisvgm (2.13.1-1) ...
Setting up libcommons-logging-java (1.2-2) ...
Setting up xfonts-utils (1:7.7+6build2) ...
Setting up libptexenc1:amd64 (2021.20210626.59705-1ubuntu0.2) ...
Setting up pandoc (2.9.2.1-3ubuntu2) ...
Setting up texlive-binaries (2021.20210626.59705-1ubuntu0.2) ...
update-alternatives: using /usr/bin/xdvi-xaw to provide /usr/bin/xdvi.bin
(xdvi.bin) in auto mode
update-alternatives: using /usr/bin/bibtex.original to provide /usr/bin/bibtex
(bibtex) in auto mode
Setting up lmodern (2.004.5-6.1) ...
Setting up texlive-base (2021.20220204-1) ...
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
/usr/bin/ucfr
mktexlsr: Updating /var/lib/texmf/ls-R-TEXLIVEDIST...
mktexlsr: Updating /var/lib/texmf/ls-R-TEXMFMAIN...
mktexlsr: Updating /var/lib/texmf/ls-R...
mktexlsr: Done.
tl-paper: setting paper size for dvips to a4:
/var/lib/texmf/dvips/config/config-paper.ps
tl-paper: setting paper size for dvipdfmx to a4:
/var/lib/texmf/dvipdfmx/dvipdfmx-paper.cfg
tl-paper: setting paper size for xdvi to a4: /var/lib/texmf/xdvi/XDvi-paper
tl-paper: setting paper size for pdftex to a4: /var/lib/texmf/tex/generic/tex-
ini-files/pdftexconfig.tex
Setting up tex-gyre (20180621-3.1) ...
Setting up texlive-plain-generic (2021.20220204-1) ...
Setting up texlive-latex-base (2021.20220204-1) ...
Setting up texlive-latex-recommended (2021.20220204-1) ...
Setting up texlive-pictures (2021.20220204-1) ...
Setting up texlive-fonts-recommended (2021.20220204-1) ...
Setting up tipa (2:1.3-21) ...
Setting up texlive (2021.20220204-1) ...
Setting up texlive-latex-extra (2021.20220204-1) ...

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Setting up texlive-xetex (2021.20220204-1) ...
Setting up rake (13.0.6-2) ...
Setting up libruby3.0:amd64 (3.0.2-7ubuntu2.7) ...
Setting up ruby3.0 (3.0.2-7ubuntu2.7) ...
Setting up ruby (1:3.0~exp1) ...
Setting up ruby-rubygems (3.3.5-2) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for fontconfig (2.13.1-4.2ubuntu5) ...
Processing triggers for libc-bin (2.35-0ubuntu3.4) ...
/sbin/ldconfig.real: /usr/local/lib/libur_adapter_level_zero.so.0 is not a
symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_0.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc_proxy.so.2 is not a symbolic
link

/sbin/ldconfig.real: /usr/local/lib/libur_loader.so.0 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbb.so.12 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libur_adapter_opencl.so.0 is not a symbolic
link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind.so.3 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbmalloc.so.2 is not a symbolic link

/sbin/ldconfig.real: /usr/local/lib/libtbbbind_2_5.so.3 is not a symbolic link

Processing triggers for tex-common (6.17) ...
Running updmap-sys. This may take some time... done.
Running mktexlsr /var/lib/texmf ... done.
Building format(s) --all.
    This may take some time...

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[ ]: [!]jupyter nbconvert --to pdf "/content/drive/MyDrive/Colab Notebooks/
      ↪Prompt-engineering.ipynb"

```