



OOPS.

Q1

Object:-

Something that has State (data), Behaviour (actions), Identity and Responsibility.

State: values given to the attribute of an object

Behaviour: Response given to the outside world.

Identity: Uniqueness of an object

Responsibility: Role of an object

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Example of Object

1) Car (Object)	2) Student (Object)
State (data)	State (data)
<ul style="list-style-type: none">• color• Speed.• model	<ul style="list-style-type: none">• name• age roll no• marks
Behaviour (action)	Behaviour (action)
<ul style="list-style-type: none">• Start()• Stop()• accelerate()• brake()	<ul style="list-style-type: none">• Study()• Given exam()• Submit Assignment()
Identity (uniqueness)	Identity (uniqueness)
<ul style="list-style-type: none">• reg number	<ul style="list-style-type: none">• Unique roll no or admission no
Responsibility (Role)	Responsibility (Role)
<ul style="list-style-type: none">• used for transport	<ul style="list-style-type: none">• attend class• complete course work



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3) mobile phone (object)
State (data)

- brand
- battery
- storage

Behaviour (action)

- call()
- message()
- take photo()

Identity (uniqueness)

- IMEI number.

Responsibility (Role)

- communication
- entertainment

4) Bank Account (object)

State (data)

- Name
- balance
- account type

Behaviour (action)

- Deposit()
- Withdraw()
- check balance()

Identity (uniqueness)

- Account number

Responsibility (Role)

- Store money
- handle transaction



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5) Television (object) State (data) - brand. - Size. - Channel. Behavior (action) - turnOn() - changeChannel() Identity (unique) - Serial number. Responsibility: - display video content.	7) Employee (Object) State (data) - name, id, Salary. Behavior (action) - work(), attend meeting() Identity (unique) - Employee ID - Responsibility (Role) - perform task.
6) BOOK (object) State (data) - title - author - page. Behavior (action): open(), read() Identity (unique) - ISBN number. Responsibility (Role) Knowledge	8) Laptop (object) State (data) - RAM, processor, battery Behavior (action) - run program(), shutdown() Identity (unique) - Serial number. - Color. Responsibility - computing task.



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9) Pen (Object)

State (data) : Color, ink level, brand.

Behaviour (action) : write ()

Identity : model number.

Responsibility : write text.

10) Fan (Object)

State : Speed, brand, size.

Behaviour : rotate (), turn on (), turn off ()

Identity : Serial number.

Responsibility : provide cooling.



2. Abstraction.

Write the definition of abstraction 10 times.



Example of abstraction.

- 1) Mobile phone: you can see only call, camera
internal circuits, processor → hidden.
- 2) ATM machine: you press withdraw 500₹
Backend tasks → hidden.
- 3) Google maps: you see a simple map and directions
Complex algorithm, GPS tracking → hidden.
- 4) Car driving: you use steering, brakes, accelerator
Engine mechanism, fuel → hidden.
- 5) TV Remote: you press volume → it increases
internal circuit, IR signals → hidden.
- 6) Washing machine: you select wash mode, start
water level control, motor speed → hidden.
- 7) Restaurant menu: you see only the menu items
you don't see how they cook, Kitchen → hidden.
- 8) Elevator: you press a button → floor changes
motor, counterweight, braking system → hidden.



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9) Web Browser:-

You type a URL and press enter
DNS → TCP/IP, rendering engine → hidden.

10) Camera App:-

You click a photo
Focus, aperture, Shutter Speed adjustment
→ hidden.



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3) Encapsulation :

- Binding + hiding data and behaviour by default
Binding because they are inseparable in real life , and they are also hidden in real life.
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Example of encapsulation.

1) Bank Account:

Balance is private, accessed only through deposit/withdraw methods.

2) Student class:

Name / age kept private, changed only through getters / setters.

3) Car Speed:

Speed variable is private you can increase it only using acceleration.

4) Employee Salary:

Salary is hidden; only HR methods can update or view it.

5) ATM Pin:

Pin is private; only verify pin() can check it.

6) Mobile Phone:

Battery percentage is hidden; you can only charge or use battery through methods.



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- 7) Hospital patient Record.

Patient's medical history is private; only doctor method can access/update it

8. Online Shopping Cart

Cart total is private; only add item() or remove item() can modify it

9. Game Character

Health points private; only take Damage() or heal() can change it

10. Email Account.

Password is private; only login() method checks it



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Inheritance.



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Example of Inheritance.

1) Dog is a Animal.

Parent class: Animal.
Child class: Dog.

2) Car is a Vehicle

Parent class: Vehicle.
Child class: Car.

3) Saving is a Account is a Bank Account.

Parent class: Bank Account.
Child class: Saving Account.

4) Teacher is a Person.

Parent class: Person.
Child class: Teacher.

5) manager is a Employee.

Parent class: Employee.
Child class: manager.

6) mobile phone is a electronic devic.

Parent class: electronic devic.
Child class: mobile phone.



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7) Refrigerator is a Appliance.

Parent class : Appliance.

Child class : Refrigerator

8) Truck is a heavy vehicle.

Parent class : heavy vehicle.

Child class : Truck.

9) Guest user is a user.

Parent class : User.

Child class : Guest user.

10) Online order is a Order.

Parent class : Order.

Child class : online Order.



A Polymorphism.

- Same message , given to generalize things, to perform same action but implemented differently
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Q Examples of polymorphism

- 1) "Start()" action.
 - Car → Start with Key.
 - bike → Start with kick.

- 2) "Draw()" action
 - Circle → Draw a Circle.
 - Square → Draw a Square.

- 3) "make sound()" for animal.
 - Dog → bark
 - cow → meow

- 4) "pay()" in payment system.
 - pay via UPI
 - pay via Card.



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5) "Send message()"

- Email → Send mail
- SMS → Send text

6) "calculatearea()"

- Rectangle: length × width.
- Circle: πr^2 .

7) "print()"

- print on paper
- print in PDF

8) "Open()"

- open a door → push/pull
- Open a program → run executable

9) "move()"

- Human - walk
- Bird - fly

10) "Login()"

- Login with password
- Login with OTP
- Login with fingerprint