Q1) Illustrate the need for the PM2 package

PM2 is a production-grade process manager for Node.js applications that ensures applications remain online, scalable, and manageable.

Need for PM2:
1. Automatic App Restart – Restarts applications if they crash, improving reliability.
2. System Reboot Persistence – PM2 keeps apps running after system reboots.
3. Monitoring & Logs – Provides real-time monitoring and access to logs for debugging.
4. Cluster Mode – Improves performance by using all CPU cores.
5. Zero-Downtime Deployments – Supports seamless reloads during deployment.
6. Simple Commands – Intuitive CLI commands make it developer-friendly.

PM2 streamlines deployment, enhances stability, and simplifies app management in production environments.

Q2) Implement a small application which uses the PM2 package (Input/Output)

Below is a simple Node.js app managed using PM2.

Step 1: Create app.js

```
// app.js
const express = require('express');
const app = express();
const port = 3000;

app.use(express.json());

app.get('/', (req, res) => {
  res.send('PM2 is managing this Node.js application!');
});

app.post('/greet', (req, res) => {
  const name = req.body.name;
```

```
  res.send(`Hello, ${name}! PM2 has your back.`);
});

app.listen(port, () => {
  console.log(`App running on http://localhost:${port}`);
});
```

Step 2: Install dependencies

```
npm init -y
npm install express
```

Step 3: Install PM2 globally

```
npm install pm2 -g
```

Step 4: Start the app using PM2

```
pm2 start app.js
```

Input (POST /greet):

```
{ "name": "Abhishek" }
```

Output:
Hello, Abhishek! PM2 has your back.

Step 5: View logs and monitor

```
pm2 logs
pm2 monit
```

Q3) Illustrate the need for a code of ethics in using PM2 or web app deployment

A code of ethics ensures responsible and fair practices in software deployment using tools like PM2.

Importance in PM2 usage:

1. Data Security – Ensure user data isn't exposed during crashes or restarts.
2. Transparency – Maintain clear deployment logs and inform stakeholders of system behaviors.
3. Reliability – Do not manipulate uptime reports; use PM2's monitoring features truthfully.
4. Accountability – Log actions and maintain access control in shared environments.
5. Respect for Privacy – Log data responsibly, avoiding exposure of sensitive information.

Ethical deployment practices build trust, maintain integrity, and align with legal standards.