```
import google.generativeai as genai
from google.colab import userdata
GOOGLE_API_KEY=userdata.get('GOOGLE_API_KEY')
genai.configure(api_key=GOOGLE_API_KEY)
```

```
pip install PyPDF2
```

```
Collecting PyPDF2
  Downloading pypdf2-3.0.1-py3-none-any.whl.metadata (6.8 kB)
Downloading pypdf2-3.0.1-py3-none-any.whl (232 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 232.6/232.6 kB 3.3 MB/s eta 0:00:00
Installing collected packages: PyPDF2
Successfully installed PyPDF2-3.0.1
```

```
import PyPDF2
def extract_text_from_pdf(pdf_path):
  """Extracts text from a given health report PDF using PyPdF2"""
  text=""
  with open(pdf_path,"rb") as file:
    reader=PyPDF2.PdfReader(file)
    for page in reader.pages:
      text += page.extract_text() + "\n"
  return text


def extract_health_insights(text):
  """Asks Gemini AI to extract key medical insights from the report"""
  model = genai.GenerativeModel("gemini-1.5-flash")
  prompt = f"Extract key insights from the following health report:\n\n{text}"
  response = model.generate_content(prompt)
  return response.text
pdf_file = "health_report.pdf"
extracted_text = extract_text_from_pdf(pdf_file)
insights = extract_health_insights(extracted_text)
print("Key Insights:\n",insights)
```

```
Key Insights:
 The report shows lab results for Mr. Kishan Goud (MR2100003157) from 01/02/2021.  Key insights include:

**Infections:**

* **Widal Test:** Elevated titers for *Salmonella Typhi* "O" (1:160) and "H" (1:80) suggest a possible past or current typhoid fever

* **Dengue:**  Negative results for Dengue NS1 antigen, IgG, and IgM antibodies rule out a current or recent dengue infection.

* **Malaria:** Negative rapid malaria tests for *Plasmodium falciparum* and *Plasmodium vivax* indicate the absence of malaria.

**Blood Profile:**

* **Complete Blood Picture (CBC):**  All values are within normal ranges except for slightly elevated ESR (erythrocyte sedimentation

* **HbA1c:**  5.4% indicates good blood glucose control, within the normal non-diabetic range (4-6%).

* **Blood Glucose:** Random blood glucose level was not provided in the extracted text.

**Liver Function Tests (LFTs):**

* All liver function test results (bilirubin, alkaline phosphatase, SGOT, SGPT, total protein, albumin, globulin, A/G ratio) fall wi

**Kidney Function:**

* **Serum Creatinine:** 0.8 mg/dl is within the normal range (0.6-1.25 mg/dl), indicating normal kidney function.

**Electrolytes:**

* **Serum Sodium:** Slightly low at 122 mmol/l (normal range: 135-146 mmol/l).
* **Serum Potassium:** Within the normal range (3.5 mmol/l).
* **Serum Chloride:** Slightly low at 97 mmol/l (normal range: 98-107 mmol/l).  The low sodium and chloride levels warrant further i


**Overall:** The most significant finding is the elevated Widal test results suggestive of a possible typhoid infection. The slightl
```

```
def summarize_health_report(text):
  """Summarizes the health report using Gemini AI"""
  model = genai.GenerativeModel("gemini-1.5-flash")
  prompt = f"Summarize the following health report in a concise manner:\n\n{text}"
  response = model.generate_content(prompt)
  return response.text
```

```
summary = summarize_health_report(extracted_text)
print("Summary:\n",summary)
```

```
Summary:
 Mr. Kishan Goud's (MR2100003157) lab results from 01/02/2021 show:

* **Widal Test:** Elevated titers for *Salmonella Typhi* "O" (1:160) and "H" (1:80), suggesting possible typhoid infection.  *Salmor
* **Dengue Serology:** Negative for NS1 antigen, IgG, and IgM.
* **ESR:** Elevated (26 mm/hr after 1 hour, 52 mm/hr after 2 hours), indicating inflammation.
* **Malaria Test:** Negative for *Plasmodium falciparum* and *Plasmodium vivax*.
* **Complete Blood Picture:**  Hemoglobin, RBC, WBC, and platelet counts within normal ranges.  Differential counts also within norm
* **HbA1c:** 5.4%, within the normal non-diabetic range.
* **Serum Creatinine:** 0.8 mg/dl, within normal range.
* **Random Blood Glucose:**  Result not provided.
* **Liver Function Test:** All values within normal ranges.
* **Serum Electrolytes:** Sodium (122 mmol/l) slightly low, potassium and chloride within normal ranges.

Overall, the results suggest possible typhoid fever, indicated by the Widal test, and mild inflammation indicated by the elevated ES
```

```
def detect_abnormalities(text):
  """Analyze lab test results and flags abnormal values"""
  model = genai.GenerativeModel("gemini-1.5-flash")
  prompt = f"Analyze the lab test results in the following health report and highlight any abnormal values:\n\n{text}"

  response = model.generate_content(prompt)
  return response.text
abnormalities = detect_abnormalities(extracted_text)
print("Potential Abnormalities:\n",abnormalities)
```

```
Potential Abnormalities:
 Based on the provided lab results, the following values fall outside the given biological reference ranges, indicating potential ab

* **Widal Test:**  S. Typhi "O" (1:160) and S. Typhi "H" (1:80) are both significantly higher than the reference range (1:20). This

* **ESR (Erythrocyte Sedimentation Rate):**  Both the 1st hour (26 mm/hr) and 2nd hour (52 mm/hr) ESR values are elevated above the

The following values are slightly outside or at the lower/upper boundaries of the reference ranges, warranting further clinical corr


* **RBC (Red Blood Cell count):** 4.3 mill/cumm is at the lower end of the normal range (4.5-5.5 mill/cumm). This alone is usually r


* **Serum Chloride:** 97 mmol/l is slightly below the lower limit of the reference range (98-107 mmol/l).  This mild hyponatremia mi

* **Serum Sodium:** 122 mmol/l is significantly below the reference range (135-146 mmol/l), indicating hyponatremia (low sodium leve

**Important Note:**  This analysis is based solely on the lab results provided.  A proper medical diagnosis requires a comprehensive
```

```
def explain_medical_terms(text):
  """Asks Gemini AI to simplify medical terms for patient understanding"""
  model = genai.GenerativeModel("gemini-1.5-flash")
  prompt = f"Explaim the medical terms in the following health report in simple language:\n\n{text}"
  response = model.generate_content(prompt)
  return response.text
explanation = explain_medical_terms(extracted_text)
print("simplified_explanation:\n",explanation)
```

```
simplified_explanation:
 This report shows the results of several blood tests performed on Mr. Kishan Goud. Let's break down each section:

**1. WIDAL Test:** This test checks for antibodies against *Salmonella typhi* and *Salmonella paratyphi*, bacteria that cause typhoi

* **S. Typhi "O" 1:160:**  Suggests a possible past exposure to typhoid fever.
* **S. Typhi "H" 1:80:** Suggests a possible past exposure to typhoid fever.  The "O" and "H" refer to different surface antigens of
* **S. Paratyphi "AH" 1:20:** Within the normal range, suggesting no recent infection.
* **S. Paratyphi "BH" 1:20:** Within the normal range, suggesting no recent infection.


**2. Dengue Serology:** This tests for dengue fever.  The results are all negative, meaning no evidence of a current dengue infectio

* **NS1 Antigen:** A protein found in dengue virus. Negative means no active infection.
* **IgG:** Antibodies that show past exposure to dengue virus. Negative means no past infection detected.
* **IgM:** Antibodies that show recent exposure to dengue virus. Negative means no recent infection detected.

**3. Erythrocyte Sedimentation Rate (ESR):** This measures how quickly red blood cells settle in a tube of blood. A higher rate ofte

**4. Rapid Malaria Test:** This test screens for malaria parasites in the blood. Both *Plasmodium vivax* (P.V) and *Plasmodium falci

**5. Complete Blood Picture (CBC):** This is a comprehensive blood test that provides information about various blood components:

* **Hemoglobin (Hb):**  Carries oxygen in the blood.  13.6 g/dL is within the normal range.
* **Red Blood Cells (RBC):**  Carry oxygen. 4.3 million/cumm is slightly low, but still within the acceptable range.
```

```
def Asks_gemini_about_report(text, question):
  """Allows users to ask question about their health report"""
  model = genai.GenerativeModel("gemini-1.5-flash")
  prompt = f"The following is a health report:\n\n{text}\n\nAnswer the following question based on the report:\n{question}"
  response = model.generate_content(prompt)
  return response.text
question = "What is the patient's diagnosis?"
answer = Asks_gemini_about_report(extracted_text, question)
print("Answer:\n",answer)
```

```
**8. Random Blood Glucose:**  This measures blood sugar at a random time.  It's important to note that this test shows a single poir
Answer:
 The provided lab report does not provide a diagnosis.  It only presents the results of various tests.  A diagnosis requires interpr
**9. Liver Function Test (LFT):**  These tests assess how well the liver is functioning. All values are within or very close to the

**10. Serum Electrolytes:** These tests measure the levels of important minerals (sodium, potassium, chloride) in the blood.  Sodium
```

Start coding or generate with AI.