Explanation and Instructions of Coursework

You must **design, implement, and report** an *Intelligent System* that uses an **Agentic AI approach**, meaning your system will have **multiple intelligent agents** that interact or cooperate to complete tasks automatically.

I. SECTION 1 — Application and Workflow Selection (10 Marks)

1. Introduction & Motivation (3 Marks)

- Explain the **context** of your chosen application (e.g., "customer support automation in telecom sector").
- Justify **why** you chose it (problem to solve, time savings, scalability, real-world relevance).
- Example:

Customer service teams often receive thousands of repetitive requests. An intelligent agentic system can automatically handle simple queries, improving efficiency and user satisfaction.

2. Explanation of the Workflow + Diagram (4 Marks)

- Show **how information flows** through your system using a **diagram** (Mermaid, Lucidchart, PowerPoint, or draw.io).
- Identify each **agent** (e.g., Query Classifier Agent → Response Generator Agent → Escalation Manager Agent).
- Describe each step in text (e.g., what data comes in, what each agent does, and what output goes out).

Example (Customer Support System):

User Query → NLP Agent (Intent Detection) → Knowledge Agent (FAQ Lookup)

→ Decision Agent (Resolve or Escalate) → Human Supervisor

3. Objectives (2 Marks)

- Write **3–4 clear, measurable goals**, such as:
  - Automate 80 % of customer queries.
  - Reduce average resolution time by 40 %.
  - Enable 24/7 support with minimal human intervention.

4. Impact (1 Mark)

- Describe the **potential benefit** if implemented in real life.
  Example: "This system can reduce operational costs and improve customer satisfaction scores."

II. SECTION 2 — Selection of AI Technologies (10 Marks)

1. Identification of Similar Systems (2 Marks)

- Find **2–3 existing systems or papers** doing similar things.
    - Mention their names, year, and what they used (e.g., "Zendesk AI Assistant (2023) uses NLP models for auto-responses").
    - This shows you studied prior work.

2. Innovative Approach (4 Marks)

- Explain **what's new** in your project compared to others.
  Examples:
    - Combining BERT and n8n to build multi-agent automation.
    - Adding sentiment analysis before response generation.
    - Introducing an explainable AI layer for human oversight.

3. AI Methods and Tools Chosen (4 Marks)

- List all tools + justify them:

Category	Choice	Why
Programming	Python	Flexibility & ML libraries
Framework	TensorFlow / PyTorch	Deep Learning support
Workflow	n8n	Multi-agent automation platform
Model	BERT / GPT-4	Natural language understanding

III. SECTION 3 — Simulations & Development Setup (30 Marks)

1. Simulation Environments and Setup Parameters (10 Marks)

- Describe the **environment** where your agents run (e.g., Python + n8n Cloud + OpenAI API).
- Include:
    - Versions (e.g., Python 3.10, TensorFlow 2.16)
    - APIs used (e.g., OpenAI GPT-4)
    - Input formats (JSON, CSV, text)
    - Template examples (e.g., JSON request to agent)

2. Agent-Wise Task Distribution, Functionality, and Datasets (10 Marks)

- Describe each agent clearly:

Agent	Function	Dataset / Input	Output
Agent 1	Intent Classifier	Text Queries (Kaggle Dataset)	Detected Intent
Agent 2	Knowledge Retriever	FAQ Database (CSV)	Suggested Answer
Agent 3	Escalation Agent	Complex Query	Ticket to Human

1. Mention **how the system starts** (e.g., user message → trigger in n8n).

2. Describe **expected outputs**.

3. Encoding and Data Processing (10 Marks)

- Describe **preprocessing** steps:
  - Cleaning data (removing stop words, punctuation).
  - Tokenization or vectorization (TFIDF, Word2Vec, BERT embeddings).
  - Normalization or encoding for numerical data.
- Explain **training/testing/validation ratios** (e.g., 70/20/10).
- Mention **evaluation metrics**:
  - Accuracy, Precision, Recall, F1, ROC-AUC (for classification).
  - MAE, RMSE (for regression).
  - If the goal is to reduce overall cost and time, this could also serve as an evaluation criterion for your automated system, alongside the accuracy of its data-driven decisions and actions.

IV. SECTION 4 — Use Case Explanation with Evidence (20 Marks)

1. Step-by-Step Workflow Execution (10 Marks)

- Choose **one example scenario** and trace it through all agents.
  Example:
  1. User sends: "I can't access my account."
  2. Agent 1 (Intent Classifier) → detects "account issue."
  3. Agent 2 (Retriever) → searches FAQ for account problems.
  4. Agent 3 (Decision Agent) → detects no solution, escalates.
  5. Agent 4 (Support Notifier) → opens ticket for human agent.
- Include **screenshots** for each step (showing input, processing, output).
- You can use **n8n workflow screens, Python console logs, or UI captures**.

2. Developed User Interface and External Interaction (10 Marks)

- If you made a **frontend**, describe it and show screenshots (HTML page, Streamlit app, chat window, etc.).
- If external APIs or models are used:
  - Describe the **interaction type** (REST API, POST/GET).
  - Show **input/output formats** (e.g., JSON schema).
  - Example:

```
{
"prompt": "reset my password",
"response": "Please click on 'Forgot Password' link..."
}
```

V. SECTION 5 — Conclusions & References (5 Marks)

1. Conclusions (3 Marks)

- Restate the **problem solved**, the **system's impact**, and **main findings**.
- Example:

  The multi-agent system effectively automated 75 % of user queries, reducing response time from 2 minutes to 5 seconds.

2. References (2 Marks)

- Use **Harvard style**.
  Example in-text:

  Similar systems were proposed by Lee et al. (2022) using BERT-based intent classification.
  Example reference list:
  Lee, H., Kim, S., and Park, J. (2022). *Intelligent chatbots for customer support.* Applied Sciences, 12(4), 4112.

Suggested Workflow Example (for inspiration)

If you still haven't chosen your theme, here are two ideas:

Option 1: Customer Service Agent System

- **Agents**: Intent Classifier → FAQ Retriever → Escalation Agent → Feedback Analyzer.
- **Tools**: Python + n8n + BERT + OpenAI API.
- **Dataset**: Customer Support Kaggle Dataset.
- **Evidence**: show logs of agent decisions, UI chat screens.

Option 2: Supply Chain Optimizer

- **Agents**: Demand Forecaster (ML), Inventory Agent (SQL), Route Optimizer (API).
- **Tools**: Python, Pandas, Scikit-Learn, Google Maps API.
- **Dataset**: Sales + Delivery Data.
- **Evidence**: charts of predicted demand vs actual.