# CBSE | DEPARTMENT OF SKILL EDUCATION
## ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

**Blue-print for Sample Question Paper for Class X (Session 2025-2026)**

**Max. Time: 2 Hours**      **Max. Marks: 50**

## PART A - EMPLOYABILITY SKILLS (10 MARKS):

| UNIT NO. | NAME OF THE UNIT | OBJECTIVE TYPE QUESTIONS | SHORT ANSWER TYPE QUESTIONS | TOTAL QUESTIONS |
|---|---|---|---|---|
| | | 1 MARK EACH | 2 MARKS EACH | |
| 1 | Communication Skills – II | 1 | 1 | 2 |
| 2 | Self-Management Skills – II | 2 | 1 | 3 |
| 3 | ICT Skills – II | 1 | 1 | 2 |
| 4 | Entrepreneurial Skills – II | 1 | 1 | 2 |
| 5 | Green Skills – II | 1 | 1 | 2 |
| | TOTAL QUESTIONS | 6 | 5 | 11 |
| | NO. OF QUESTIONS TO BE ANSWERED | Any 4 | Any 3 | Any 7 |
| | TOTAL MARKS | 1 x 4 = 4 | 2 x 3 = 6 | 10 MARKS |

## PART B - SUBJECT SPECIFIC SKILLS (40 MARKS):

| UNIT NO. | NAME OF THE UNIT | OBJECTIVE TYPE QUESTIONS | SHORT ANSWER TYPE QUESTIONS | DESCRIPTIVE/ LONG ANS. TYPE QUESTIONS | TOTAL QUESTIONS |
|---|---|---|---|---|---|
| | | 1 MARK EACH | 2 MARKS EACH | 4 MARKS EACH | |
| 1 | Unit 1: Revisiting AI Project Cycle & Ethical Frameworks for AI | 5 | 1 | 1 | 7 |
| 2 | Unit 2: Advanced Concepts of Modeling in AI | 4 | 2 | 2 | 8 |
| 3 | Unit 3: Evaluating Models | 6 | 1 | 1 | 8 |
| 4 | Unit 5: Computer Vision | 4 | 1 | - | 5 |
| 5 | Unit 6: Natural Language Processing | 5 | 1 | 1 | 7 |
| | TOTAL QUESTIONS | 24 | 6 | 5 | 35 |
| | NO. OF QUESTIONS TO BE ANSWERED | Any 20 | Any 4 | Any 3 | Any 27 |
| | TOTAL MARKS | 1 x 20 = 20 | 2 x 4 = 8 | 4 x 3 = 12 | 40 MARKS |

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## ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 417)

### Sample Question Paper for Class X (Session 2025-2026)

**Max. Time: 2 Hours**                                                                                  **Max. Marks: 50**

## General Instructions:

1.  Please read the instructions carefully.

2.  This Question Paper consists of **21 questions** in two sections: Section A & Section B.

3.  Section A has Objective type questions whereas Section B contains Subjective type questions.

4.  **Out of the given (5 + 16 =) 21 questions, a candidate has to answer (5 + 10 =) 15 questions in the allotted (maximum) time of 2 hours.**

5.  All questions of a particular section must be attempted in the correct order.

6.  **SECTION A - OBJECTIVE TYPE QUESTIONS (24 MARKS):**

    i.     This section has 05 questions.

    ii.    Marks allotted are mentioned against each question/part.

    iii.   There is no negative marking.

    iv.    Do as per the instructions given.

7.  **SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):**

    i.     This section has 16 questions.

    ii.    A candidate has to do 10 questions.

    iii.   Do as per the instructions given.

    iv.    Marks allotted are mentioned against each question/part.

# SAMPLE QUESTION PAPER-2

## SECTION A

**Q.1.** **Answer any 4 out of the given 6 questions on Employability Skills (1 × 4 = 4 marks)**

**i.** Neethi Ravindran had a unique voice which was easy to recognize.Identify the type of sentence.

    (*a*) imperative                 (*b*) declarative

    (*c*) interrogative             (*d*) exclamatory         **1**

**ii.** Mani has her final exam coming up. She creates a study schedule and sticks to it, balancing her study time with short breaks. Which self-management skill is she demonstrating?

    (*a*) Emotional Intelligence       (*b*) Managing Emotions

    (*c*) Stress management          (*d*) Time management      **1**

**iii.** Which of the following is a common misconception about entrepreneurship ?

    (*a*) Starting a business requires a large amount of initial capital

    (*b*) Entrepreneurs are not always successful on their first attempt

    (*c*) Its not required to have extensive industry experience to become entrepreneurs

    (*d*) Entrepreneurs may need to collaborate with others      **1**

**iv.** Which file extension is commonly used for image files?

    (*a*) .txt                      (*b*) .exe

    (*c*) .jpg                      (*d*) .mp3                **1**

**v.** In SMART goals, what does 'S' stand for?

    (*a*) Simple                 (*b*) Specific

    (*c*) Special                (*d*) Social               **1**

**vi.** **Assertion (A) :** Green skills are essential for sustainable development.

    **Reason (R) :** They help in reducing environmental impact and promote eco-friendly practices.

    (*a*) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

    (*b*) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A)

    (*c*) Assertion (A) is true, but Reason (R) is false

    (*d*) Assertion (A) is false, but Reason (R) is true      **1**

**Q.2.** **Answer any 5 out of the given 6 questions :** **(1 × 5 = 5 marks)**

**i.** Which of the following is **NOT** a main principle of bioethics?

(*a*) Respect for Autonomy           (*b*) Do not harm

(*c*) Ensure maximum benefit for all     (*d*) Give injustice       **1**

**ii.** Which of the following provides a systematic approach to navigating complex moral dilemmas by considering various ethical principles and perspectives?

(*a*) Ethical values              (*b*) Ethical frameworks

(*c*) Ethical dilemma            (*d*) Ethical codes         **1**

**iii.** *A self-driving car uses a camera to capture images of the road.Before the car can make decisions, the computer must **separate different parts of the image** — such as roads, vehicles, pedestrians, and traffic signs — so that it can identify where to drive safely.*

*To do this, the computer groups together pixels that have similar colors and patterns, such as all pixels belonging to the road in one group, all pixels of cars in another, and all pixels of people in a third group.*

Which AI technique is being used by the self-driving car to group similar pixels and identify different objects in an image?

(*a*) Classification               (*b*) Regression

(*c*) Clustering                 (*d*) Prediction          **1**

**iv.** ..................... is the process of using different evaluation metrics to understand a machine learning model's performance.        **1**

**v.** **Assertion (A) :** The less pixels you have, the better is the image quality.

**Reason (R) :** Resolution refers to the number of pixels per unit of area in an image, determining its clarity and detail.

(*a*) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

(*b*) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A)

(*c*) Assertion (A) is true, but Reason (R) is false

(*d*) Assertion (A) is false, but Reason (R) is true        **1**

**vi.** The first step of Bag of Words algorithm is Text Normalisation. Which of the following task is done in this step ?

(*a*) Creating document vectors

(*b*) Collecting and pre-processing data

(*c*) Adding the words to a dictionary

(*d*) Creating a vector of words       **1**

**Q.3.** **Answer any 5 out of the given 6 questions :** **(1 × 5 = 5 marks)**

**i.** Which domain is used in surveillance systems to monitor public spaces, buildings, and borders?        **1**

ii. The school canteen is using an AI model to predict whether a food item will be a bestseller.The model considers four features, each assigned a specific weight based on its importance:
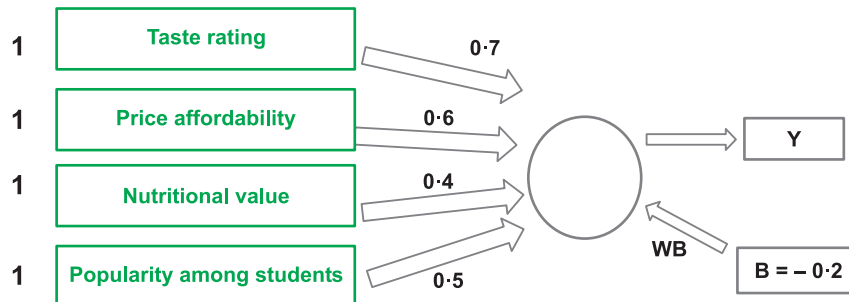


A bias value of – **0·2** is added.  The formula used is:

$$y = w_1x_1 + w_2x_2 + w_3x_3 + w_4x_4 + (1 \times b)$$

**What will be the value of _y_ for the given scenario?**

(_a_) 0·6　　　　　　　　　　　　　　　(_b_) 0·8

(_c_) 1·0　　　　　　　　　　　　　　　(_d_) 1·2　　　　　　　　　　　1

iii. **Assertion (A) :** A machine learning model must be evaluated using a testing dataset.

**Reason (R) :** The testing dataset helps estimate the model's performance on new, unseen data by comparing predicted values with expected outputs.

(_a_) Both A and R are true, and R is the correct explanation of A

(_b_) Both A and R are true, but R is not the correct explanation of A

(_c_) A is true, but R is false

(_d_) A is false, but R is true　　　　　　　　　　　　　　　　　1

iv. In an ice cream factory, 950 out of 1000 ice creams were wrapped correctly on the assembly line. What is the error rate of the wrapping process?

(_a_) 4%　　　　　　　　　　　　　　　(_b_) 6%

(_c_) 3%　　　　　　　　　　　　　　　(_d_) 5%　　　　　　　　　　　1

v. Snapchat  is an application of .................. .

(_a_) NLP　　　　　　　　　　　　　　(_b_) Computer Vision

(_c_) Data Science　　　　　　　　　　(_d_) Blockchain Technology　　　1

vi. Which of the following applications of NLP (Natural Language Processing) is associated with spam filtering in e-mails ?

(_a_) Virtual Assistants　　　　　　　　(_b_) Sentiment Analysis

(_c_) Text Classification　　　　　　　(_d_) Automatic Summarization　　　1

**Q.4.** **Answer any 5 out of the given 6 questions :**　　　　　　**(1 × 5 = 5 marks)**

i. **Assertion (A) :** AI models can be categorized into domains such as Statistical Data, Computer Vision, and Natural Language Processing (NLP).

**Reason (R) :** These domain categorizations are based on the type of data used — numerical data, image data, and text data respectively.

(*a*) Both A and R are true, and R is the correct explanation of A

(*b*) Both A and R are true, but R is not the correct explanation of A

(*c*) A is true, but R is false

(*d*) A is false, but R is true **1**

ii. The raw form of data (or) Data to which no tag is attached is known as ............. data. **1**

iii.

| Transaction ID | Actual Value | Predicted Value |
|---|---|---|
| 1 | Fraudulent | Fraudulent |
| 2 | Non-Fraudulent | Fraudulent |
| 3 | Fraudulent | Non-Fraudulent |
| 4 | Non-Fraudulent | Non-Fraudulent |

In the given table, identify the **Transaction ID** that represents a **False Negative** case.

(*a*) 1                  (*b*) 2

(*c*) 3                  (*d*) 4 **1**

iv. Which metric (Precision or Recall) is to be used for Safe Content Filtering (like Kids YouTube)? **1**

v. What does the term "image processing" refer to in Computer Vision?

(*a*) Editing videos

(*b*) Extracting meaningful information from images

(*c*) Playing audio files          (*d*) Compiling codes **1**

vi. Which type of chat-bot has a wide functionality, is flexible and powerful, and works on bigger databases directly ? **1**

**Q.5. Answer any 5 out of the given 6 questions :**          **(1 × 5 = 5 marks)**

i. Which of the following statements best describes the **Problem Scoping** stage in an AI project?

(*a*) It involves training the AI model with large datasets

(*b*) It is the stage where the model's accuracy is tested and evaluated

(*c*) It deals with converting data into numerical form for processing

(*d*) It focuses on defining the problem clearly and identifying factors that affect it **1**

ii. ............................ is a type of machine learning in which a machine learns to perform a task through a repeated trial-and-error method. **1**

iii. *"**Honest explanation** how the chosen evaluation metrics work and produce results without keeping any information hidden"*Which ethical concern can you relate the given statement to?

(*a*) Bias               (*b*) Transparency

(*c*) Accountability        (*d*) Robustness      **1**

**iv.** How many channels does a colour image have?      **1**

**v.** A corpus contains 4 documents in which the words such as 'an, is, the' were appearing frequently. Identify the term that is used for such words.

(*a*) Stop word           (*b*) Missing word

(*c*) Rare word           (*d*) Removable word      **1**

**vi.** The process of linking sentences so that each one relates to the preceding and succeeding sentences, forming a coherent story is called ................ .

(*a*) Syntactic Analysis        (*b*) Semantic Analysis

(*c*) Pragmatic Analysis       (*d*) Discourse Integration      **1**

## SECTION B

**Answer any 3 out of the given 5 questions on Employability Skills (2 × 3 = 6 marks)**
**Answer each question in 20 – 30 words.**

**Q.6.** Name and discuss any two elements of a communication cycle.      **2**

**Q.7.** Mention any four simple stress management techniques.      **2**

**Q.8.** Define the following terms :

(*a*)Firewall            (*b*) Worms      **2**

**Q.9.** Differentiate between wage employed people and self-employed people.      **2**

**Q.10.** Briefly discuss the importance of Sustainable Development.      **2**

**Answer any 4 out of the given 6 questions in 20 – 30 words**
**each (2 × 4 = 8 marks)**

**Q.11.** Define the following:

(*a*) Maleficence         (*b*) Beneficence      **2**

**Q.12.** Write the full form of CNN, and explain how a CNN processes data.      **2**

**Q.13.** *The school robotics club is developing an AI application.The system uses statistical methods that enable the machine to improve its predictions with experience. It learns from the new data fed to it, takes note of errors made during testing, and uses this information to perform better in the next iteration.*

**1.** Which application of AI is described in the paragraph?

**2.** Identify the correct subset of AI being spoken about.      **2**

**Q.14.** Why is it important to split a dataset into training and testing sets when building a machine learning model?      **2**

**Q.15.** Name the tasks used in Computer Vision applications for :

(*a*) Single objects         (*b*) Multiple objects      **2**

**Q.16.** Differentiate between stemming and lemmatization.      **2**

**Q.17.** Identify the correct terms in place of 1, 2, 3, 4 and explain them. **4**

```
            Ethical
          Frameworks
            for AI

      1              Value based

    2          3          4
```
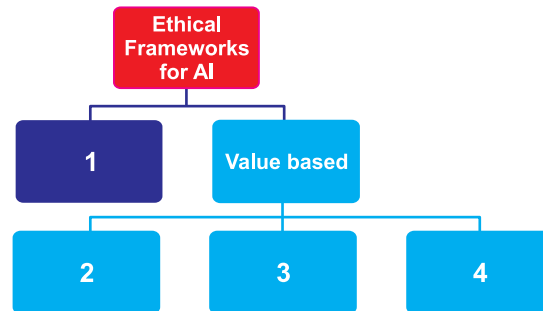
**Q.18.** What are rule-based and learning-based Al models? Compare their advantages and disadvantages. **4**

**Q.19.** With a neat diagram, explain the relationship between AI, ML and DL. **4**

**Q.20.** A sentiment analysis model was built to classify movie reviews as either. 'Positive' or 'Negative'. The model was tested on a dataset of 500 reviews, resulting in the following confusion matrix :

| Confusion Matrix | | Reality | |
|---|---|---|---|
| | | Yes | No |
| Predicted | Yes | 300 | 40 |
| | No | 60 | 100 |

(*a*) How many total cases are True Positive in the above scenario?

(*b*) Calculate Precision, Recall and $F_1$-Score.

**Q.21.** You have two documents :

**Document 1 :** Sheetal and Mitali are friends.

**Document 2 :** Mitali likes singing songs while Sheetal likes listening to music.

Through a step-by-step process, calculate TFIDF for the given corpus. **4**

# Answer Key

## SECTION A

**Ans.1.** **i.** (*b*) declarative

**ii.** (*d*) Time management

**iii.** (*a*) Starting a business requires a large amount of initial capital.

**iv.** (*c*) .jpg        **v.** (*b*) Specific

**vi.** (*a*) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

2. **i.** (*d*) Give injustice     **ii.** (*b*) Ethical frameworks     **iii.** (*c*) Clustering

   **iv.** Model evaluation

   **v.** (*d*) Assertion (A) is false, but Reason (R) is true.

   **vi.** (*b*) Collecting and pre-processing data

3. **i.** Computer Vision     **ii.** (*a*) 0·6

   **iii.** (*a*) Both A and R are true, and R is the correct explanation of A.

   **iv.** (*d*) 5%        **v.** (*b*) Computer Vision     **vi.** (*c*) Text Classification

4. **i.** (*a*) Both A and R are true, and R is the correct explanation of A.

   **ii.** unlabelled        **iii.** (*c*) 3       **iv.** Recall

   **v.** (*b*) Extracting meaningful information from images     **vi.** Smartbot

5. **i.** (*d*) It focuses on defining the problem clearly and identifying factors that affect it.

   **ii.** Reinforcement learning     **iii.** (*b*) Transparency

   **iv.** three        **v.** (*a*) Stop word

   **vi.** (*d*) Discourse Integration

## SECTION B

**Q.6.** Thevarious elements of a communication cycle are :

**Sender :** The person beginning the communication.

**Message :** The information that the sender wants to convey.

**Channel :** The means by which the information is sent.

**Receiver :** The person to whom the message is sent.

**Feedback :** The receiver's acknowledgement and response to the message.

**Q.7.** Four simple stress management techniques are as follows :

(*a*) Time Management         (*b*) Physical exercise and fresh air

(*c*) Healthy diet             (*d*) Positivity

**Q.8.** **(A) Firewalls** monitor the data coming in and going out of a computer or network and help prevent unauthorized access and harmful programs such as viruses from entering.

**(B)Worms** are malicious programs that replicate themselves and spread across files or networks once they infect a computer. This makes them difficult to detect and remove.

**Q.9.** **Wage-employed people** are individuals who work for another person or an organization and receive wages or a salary in return for their work.

**Self-employed people** are those who start and run their own businesses to provide goods or services that meet the needs of others.

**Q.10.** Sustainable development is important because it ensures that natural resources are used carefully and conserved for future generations. It promotes economic growth without harming the environment, protecting resources for long-term use.

**Q.11.** (*a*) "Maleficence" refers to the concept of intentionally causing harm or wrongdoing.

(*b*) "Beneficence" refers to the ethical principle of promoting and maximizing the well-being and welfare of individuals and society. It emphasizes taking actions that produce positive outcomes and contribute to the overall good, ensuring that the greatest benefit is achieved for all stakeholders involved.

**Q.12.** The full form of CNN isConvolutional Neural Network. Convolutional Neural Network is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.

**Q.13.** **1.** Object classification/Smart wardrobe classifier.

**2.** Machine learning.

**Q.14.** Train-test split is needed to estimate the performance of a machine learning model on new data. The model is trained using known inputs and outputs, and then tested on unseen data to compare predicted values with expected values, simulating real-world usage.

**Q.15.** **Single Objects :**

(*i*) classification　　　　　　　　(*ii*) classification + localization

**Multiple Objects :**

(*i*) Object Detection　　　　　　　(*ii*) Instance segmentation

**Q.16.**

| Stemming | Lemmatization |
|---|---|
| It is the process of removing the affixes and converting the word to its base form in which the stemmed word:<br>• may or may not be meaningfulo<br>• base word may or may not be correct<br>It takes lesser time to execute.<br>**Eg : caring → car** | It is the process of removing the affixes and converting the word to its base form in which the lemma of the word:<br>• is a meaningful one<br>• base word is correct<br>It takes more time to execute.<br>**Eg : caring → care** |

**Q.17.** **1. Sector-based Frameworks :** These are frameworks tailored to specific sectors or industries. In the context of AI, one common sector-based framework is Bioethics, which focuses on ethical considerations in healthcare. It addresses issues such as patient privacy, data security, and the ethical use of AI in medical decision-making. Sector-based ethical frameworks may also apply to domains such as finance, education, transportation, agriculture, governance, and law enforcement.　　　　　　　　　　　　　　　　2/3/4

**Rights-based :** Prioritizes the protection of human rights and dignity, valuing human life over other considerations. It emphasizes the importance of respecting individual autonomy,

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dignity, and freedoms. In the context of AI, this could involve ensuring that AI systems do not violate human rights or discriminate against certain groups.

**Utility-based :** Evaluates actions based on the principle of maximizing utility or overall good, aiming to achieve outcomes that offer the greatest benefit and minimize harm. It seeks to maximize overall utility or benefit for the greatest number of people. In AI, this might involve weighing the potential benefits of AI applications against the risks they pose to society, such as job displacement or privacy concerns.

**Virtue-based :** This framework focuses on the character and intentions of the individuals involved in decision-making. It asks whether the actions of individuals or organizations align with virtuous principles such as honesty, compassion, and integrity. In the context of AI, virtue ethics could involve considering whether developers, users, and regulators uphold ethical values throughout the AI lifecycle.

**Q.18.**

| Rule-based models | Learning-based models |
|---|---|
| Follow predefined logical rules. | Learn patterns from data and improve over time. |
| **Example :** A chatbot answering queries using fixed responses. | **Example :** A self-learning chatbot using Natural Language Processing (NLP). |
| **Advantages :** Highly predictable, easy to program. | **Advantages :** Can adapt to new data, suitable for complex tasks. |
| **Disadvantages :** Cannot adapt to new data, requires constant updates. | **Disadvantages :** Requires large datasets and high computational power. |

**Q.19.**
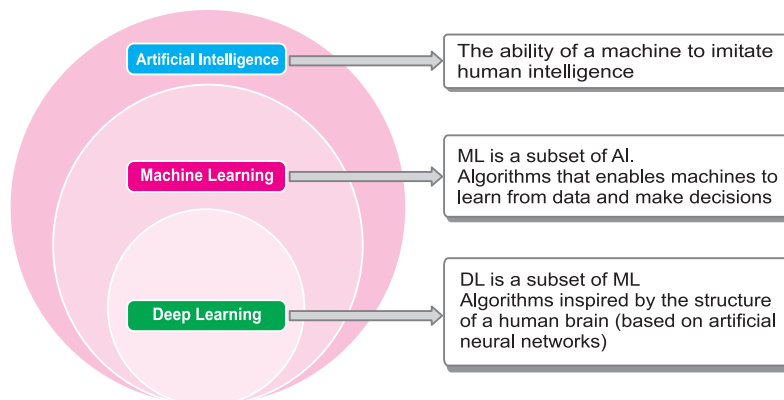


**Q.20.** (A)   From the confusion matrix :

True Positive (TP) = 300

So, there are 300 cases that are True Positive.

(B)   TP = 300, TN = 100, FP = 40, FN = 60

Precision = TP/(TP + FP)

Precision = 300/(300 + 40) = 300/340 = 0·882

Recall = TP/(TP  FN)

Recall = 300/(300 + 60) = 300/360 = 0·833

F1 score = 2* (Precision *Recall)/(Precision + Recall)

$$F1 \;=\; \frac{2 \times (P \times R)}{(P + R)} = \frac{2 \times (0{\cdot}882 \times 0{\cdot}833)}{(0{\cdot}882 + 0{\cdot}833)} = \frac{1{\cdot}469}{1{\cdot}715} = 0{\cdot}8568$$

**Q.21.**

**Document Vector table/Term Frequency table**

|  | Sheetal | and | Mitali | are | friends | likes | singing | songs | while | listening | to | music |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Document 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Document 2 | 1 | 0 | 1 | 0 | 0 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |

**Document Frequency table**

| Sheetal | and | Mitali | are | friends | likes | singing | songs | while | listening | to | music |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

**Inverse Document Frequency table**

| Sheetal | and | Mitali | are | friends | likes | singing | songs | while | listening | to | music |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2/2 | 2/1 | 2/2 | 2/1 | 2/1 | 2/1 | 2/1 | 2/1 | 2/1 | 2/1 | 2/1 | 2/1 |

**TF* log (IDF)**

|  | Sheetal | and | Mitali | are | friends | likes | singing | songs | while | listening | to | music |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Document 1 | 1*log2/2 | 1*log2/1 | 1*log2/2 | 1*log2/1 | 1*log2/1 | 0*log2/1 | 0*log2/1 | 0*log2/1 | 0*log2/1 | 0*log2/1 | 0*log2/1 | 0*log2/1 |
| Document 2 | 1*log2/2 | 0*log2/1 | 1*log2/2 | 0*log2/1 | 0*log2/1 | 2*log2/1 | 1*log2/1 | 1*log2/1 | 1*log2/1 | 1*log2/1 | 1*log2/1 | 1*log2/1 |