RESULTS AND DISCUSSION

a) Division of classes in ranges and allocating Marks

The allocation of marks after calculating the cosine similarity is done by making classes based on the ranges on a scale of 0 to 9. These classes tell us the category of the answer, such as Good, Very Good or Excellent. This helps to make the process of allocation of marks smoother and more organized.

This is shown in table I.

TABLE I
CLASS WITH RANGES

Class	Range
Good	0-3
Very Good	4-6
Excellent	7-9

b) Calculation of Cosine similarity

The proposed system usescosine similarity to normalize the length of documents. It is calculated between two tokenized texts and an approximate score is given based on the comparison between the student's answer and the actual answer. The cosine similarity is found in the range [-1,1], which when multiplied by 10 generates the marks scored by the student.

c) Comparison b/w Human Evaluation and Proposed System

This step plays an important role in checking the accuracy of the proposed system. we first show the result obtained by the algorithm developed using the tools and technology. After that, we also evaluated the student's responses manually with the help of teachers inorder to check the consistency of the result.

This is shown in table III.

TABLE II
COSINE SIMILARITY CALCULATION

Question	Student	Cosine Similarity
Q1	1	0.7035
	2	0.5687
	3	0.4157
	4	0.4747
	5	0.3527
	6	0.5119
	7	0.6080
	8	0.7424
	9	0.7689
Q2	1	0.6424
	2	0.5801
	3	0.6859
	4	0.8891
	5	0.6083
	6	0.6246
	7	0.6080
	8	0.5452
	9	0.9049
Q3	1	0.8314
	2	0.5787
	3	0.7197
	4	0.6624
	5	0.3905
	6	0.7841
	7	0.5746
	8	0.6000
	9	0.9055
Q4	1	0.7428
	2	0.5411
	3	0.6890
	4	0.7105
	5	0.5568
	6	0.6194
	7	0.8528
	8	0.7659
	9	0.5567
Q5	1	0.9028
	2	0.5678
	3	0.6722
	4	0.8567
	5	0.6780
	6	0.5257
	7	0.4896
	8	0.9040
	9	0.6789

TABLE III
COMAPRISON BETWEEN HUMAN AND MACHINE SCORE

Student	Machine Score	Human Score
1	7.0	8.0
2	5.6	8.0
3	4.1	6.0
4	4.7	6.0
5	3.5	6.0
6	5.1	8.0
7	6.0	8.0
8	7.4	8.0
9	7.6	9.0
1	6.4	9.0
2	5.8	8.0
3	6.8	9.0
4	8.8	9.0
5	6.0	9.0
6	6.2	9.0
7	6.0	6.0
8	5.4	6.0
9	9.0	9.0
1	8.3	9.0
2	5.7	6.0
3	7.1	8.0
4	6.6	8.0
5	3.9	4.0
6	7.8	8.0
7	5.7	6.0
8	6.0	8.0
9	9.0	9.0
1	7.4	8.0
2	5.4	6.0
3	6.8	8.0
4	7.1	8.0
5	5.5	6.0
6	6.1	8.0
7	8.5	9.0
8	7.6	8.0
9	5.5	6.0
1	9.0	9.0
2	5.6	6.0
3	6.7	8.0
4	8.5	9.0
5	6.7	9.0
6	5.2	6.0
7	4.8	6.0
8	9.0	9.0
9	6.7	9.0

The current manual evaluation system takes 60 seconds to evaluate an answer, while the proposed system takes 15 seconds. The proposed system is 300% more time efficient and 75-87 accurate than the manual system. It can evaluate 5760 answers in a day, while a human working for 8 hours can evaluate 480 answers a day.

The proposed system eliminates the human effort and time to evaluate an answer, and can evaluate 1100% more answers compared to the manual system. The installation of the proposed system is one time investment with negligible maintenance cost.