A COMPARATIVE STUDY OF SEVERAL PARAMETERS OF CEMENT AVAILABLE IN LOCAL MARKETS IN BANGLADESH

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DECLARATION

The dissertation entitled "A Comparative Study of Several Parameters of Cement Available in Local Markets in Bangladesh" has been performed under the supervision of **J M Raisul Islam Shohag**, (Lecturer) Department of Civil Engineering, Daffodil International University, Dhaka, Bangladesh and got permission in partial completion of the requirement for the Bachelor of Science in Civil Engineering. To the best of our knowledge, the thesis contains no materials previously published or written by another individual except where due reference is prepared in the capstone itself.

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ABSTRACT

Cement tests are carried out to determine the durability and distinctive qualities of cement. Today, a number of tests on cement are used to evaluate its quality. Various Cement Testing Methods are used to determine cement's qualities, including its specific gravity, strength, fineness, consistency, etc. Before using a material in a construction project, it must be tested.We have worked with cement of different companies in Bangladesh market, we have worked with cement of four types of companies, which are Shah Cement, Fresh Cement, Premier Cement, Bengal Cement. With four types of cement, we have done three types of tests which are Normal Consistency, Initial Setting Time, and Compression Strength test of Cement mortar. Normal Consistency, Initial Setting Time, Compression strength Test of Cement mortar after testing these we got many results which we describe below. Premier cement at 30% of water for (90 ml) and penetration 10 mm. Premier cement at 30% of water for (90 ml), It took 165 minutes for penetration 25 mm. Shah Cement for 28 days compression test of cement mortar was found to be 28.28 Mpa.

Keywords: Local Cement**,** Normal Consistency, Initial Setting Time, Compression strength Workability.

TABLE OF CONTENT

List of Table

List of Figure

CHAPTER 1
INRODUCTION

1.1 General

A minimum quantity of water added to cement that initiate the chemical reaction between water and cement to form a uniform paste of sufficient viscosity and desirable strength is known as consistency of cement. Normal consistency test of cement is done by Vicat apparatus consist of Vicat apparatus, Plunger, Vicat Mould, scale and weighing balance, measuring cylinder and glass plate.

Initial Setting time of cement & its test procedure we know about initial setting time setting time of cement and its test procedure explanation significance and result with the help of Vicat apparatus.

The compressive strength of mortar is determined using 2-inch x 2- inch cubes in accordance with the standard test method for compressive strength of hydraulic cement mortars. Mortar is a mixture of cement, sand mixed with water. The mortar mix ratio is 1:2 cement to sand ratio.

This project is mainly concerned with the study "A COMPARATIVE STUDY OF SEVERAL PARAMETERS OF CEMENT AVAILABLE IN LOCAL MARKET IN BANGLADESH".

1.2 Background of Thesis

We have worked "A COMPARATIVE STUDY OF SEVERAL PARAMETERS OF CEMENT AVAILABLE IN LOCAL MARKET IN BANGLADESH" effectiveness. The different type of cement available in local market in Bangladesh. We have worked with different types of cement from different companies. Which are the Shah Cement, Premier Cement, Fresh Cement, Bengal Cement. The definition of a cement paste's normal consistency (in terms of water content) is that consistency at which the vicat plunger may penetrate to a point 10 mm below the top of the vicat mould. The typical range of values is 22 to 30 percent of the dry cement's weight. To postpone the hydration or hardening process, an initial setup time period is necessary. The paste totally loses its flexibility at final setting time. It is the amount of time required for the cement paste or concrete to sufficiently cure and take the shape of the mold into which it is cast. Compressive testing demonstrates how a material will respond to compression. Compression testing may assess a material's plastic flow behavior and ductile fracture limits as well as determine how a material responds to crushing loads.

1.3 Scope of the study

The different type of cement available in local market in Bangladesh. We have worked with different types of cement from different companies. Which are the Shah Cement, Premier Cement, Fresh Cement, Bengal Cement. The main focus is to find out the normal consistency test, Initial setting time and compression test of cement mortar. If less water is added than is necessary, the cement won't be adequately hydrated, which will cause it to lose strength. Ordinary Portland cement has a standard or normal consistency that ranges from 22 to 30%. 22–30% water is added to cement to create a cement paste mixture with a standard consistency. The first time refers to the point at which cement starts to become less plastic after combining with water to form a paste. The final setting time is the period of time when cement entirely stops being plastic after mixing with water and starts to have a specified level of structural strength. One of the most crucial characteristics of concrete and mortar is its compressive strength. Therefore, the performance characteristics of the combination and the overall quality of the completed product are greatly influenced by the strength of the binder (cement).

1.4 Limitation of the Study

The task of directing examples of actual inclusions and evaluating research strategies for Coronavirus illness 2019 has been one of the most difficult but clever design assignments (COVID-19). The findings show that there is no proof that the study's conditions are more common than the larger example collection of projects that really encountered shutdown limitations. In the end, it will be unfortunately unrealistic to look for test assortment from a certain place within the timelines of the exploration, thus the institutional point of view is restricted to person's specific investigation concerns.

1.5 Objective

The objectives of this project and thesis:

a. To determine of Normal consistency of different cement available in local markets in Bangladesh.
b. To determine of Initial setting time of different cement available in local markets in Bangladesh.
c. To determine of Compressive strength of different cement available in local markets in Bangladesh.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

This section provides some basic information about the traits and characteristics of a standard consistency test, the start of the concrete setting season, and a pressure trial of concrete. A small amount of review work has been completed to gather reliable information regarding the specifics of a few concrete tests, such as their components, setting time, and blending methods, as well as their range of capabilities. However, little details regarding the concrete trial in relation to the country may have been acquired due to the high level of secrecy maintained by many makers. The overview of this section, which will cover the significance of each work, has introduced a close evaluation of this work. A few lab-based projects several significant pieces have been highlighted in the.

2.2 Literature Review

This paper's major goal is to use steel fibers as fiber reinforcement to increase the compressive and tensile strength of concrete. Concrete's compressive strength and split tensile strength are found to be at their maximum at 2% steel fiber mixing. Finally, it can be said that steel fiber reinforced concrete becomes stronger and more workable than regular concrete. (J. M. R. I. Shohag, S. Chowdhury, A. Hasan, 2022)

This study's main goal is to compare plain concrete with reinforced concrete's compressive and split tensile strengths. Concrete can be made more reasonably priced and with less environmental damage by using hair as a fiber. In compressive and tensile strength tests, it appears that male hair fibers containing 2% and 1.5% of male hair produce the best results. (J. M. R. I. Shohag , K. K. Islam,M. N. I. Bhuiyan, 2022)

The study's main goal was to create an M25 concrete mix and determine its compressive strength utilizing various mix design techniques. The test results indicate that adding 30% fly ash to cement increased strength to its maximum level at 28 days, while the rate of strength improvement relative to regular Portland cement concrete (OPCC) is slower in the early days. (K.Param Singh,U.Praveen Goud, S.Madan Mohan,Dr. S. Sreenatha Reddy, 2016)

Finding out how well polypropylene fiber reinforced concrete performs mechanically under compression and split tensile loads is the goal of this investigation. The enhanced compressive strength in the feces caused by the fiber % is not due to cement paste bonding, but rather the bonding between the fiber and aggregate. Concrete is more durable before failing because of the fibers' role as anchors between the cement paste and the fine and coarse particles. (Saman Khan,Roohul Abad Khan,Amadur Rahman Khan,Saiful Islam, 2016)

Long and very soft and lustrous, jute is a fiber. It is capable of being spun into tough, coarse threads. In terms of production volume and the variety of applications, it is the second most widely used and least expensive natural fiber after cotton. Cellulose, lignin, and pectin are the three main plant-derived substances that make up jute fibers. Both the fiber and the plant from which it comes are commonly referred to as "jute." This particular species belongs to the genus Corchorus, which is in the family Tiliaceae. In addition to producing cloth for clothing, jute is most frequently used to make gunny sacks and gunny fabric. On the other hand, jute is gradually being replaced by synthetic materials in various uses. Jute is used to make silk-like imitations by spinning it into incredibly fine threads. The fibers are either used on their own or in combination with those of other types of fibers to make twine and rope. The butts, or rough ends, of the jute plant are used to make inexpensive textile. (Sk. Sharfuddin Chestee,Pinku Poddar,Tushar Kumar Sheel,Md. Mamunur Rashid,Ruhul A. Khan, A. M. Sarwaruddin Chowdhury, 2017)

A crop known as jute does best in hot, humid climates and grows best during the rainy season. China, India, and Bangladesh are the three countries with the biggest production of jute. To grow the crop, farmers sow the jute plant's seeds in prepared soil. The plants are divided into smaller groups when they are about 6 inches (15 cm) tall. Four months after the seeds are sown, the harvesting procedure begins. The plants are often harvested after blooming but before the blooms release seeds. The stalks are cut close to the ground by workers. The stalks are strung up together, packed, and steeped (soaked). The tissues become more malleable as a result of this treatment, which makes it simpler to separate the fibers. The fibers are then separated from the stalks in long strands and rinsed in crystal-clear, flowing water. On thatched roofs, they are then either hung up or spread out to dry. The fibers are bundled together and tied with string after drying for two or three days. (Sk. Sharfuddin Chestee,Pinku Poddar,Tushar Kumar Sheel,Md. Mamunur Rashid,Ruhul A. Khan, A. M. Sarwaruddin Chowdhury, 2017)

Several research studies on the concrete and mortar mixture containing jute fiber were conducted, each of which concentrated on a particular proportion. The effect that chemicals or acids have on concrete mixtures that incorporate jute fibers must thus be studied through research. This study's strength is its investigation of the impact chopped jute fiber has on concrete's compressive and tensile strengths after 7 and 28 days. Three different concrete formulations were each added 0.5 percent, 1 percent, and 1.5 percent of jute fiber to make the jute fiber reinforced concrete (CIJF). In addition, concrete specimens reinforced with jute fiber were given the opportunity to cure in an acid solution for 28 days in order to assess the effect of acid on the mechanical properties of the specimens. (Naraindas Bheel,Samiullah Sohu,Paul Awoyera,Ashok Kumar,Suhail Ahmed Abbasi,Oladimeji B. Olalusi, 2021)

While initial setting time was observed to reduce with decreasing SF level, water requirement for normal consistency increased. Workability was also discovered to decline with silica fume content when assessed in terms of slump. Although the slump values decreased, the workability was still higher than those of the Portland cement control concrete. The use of fly ash and silica-fume boosted the compressive strength of concrete by up to 145%. (Rui Yu, Zhonghe Shui, and Jun Dong, 2019)

Throughout the test, the response always followed the direction of the applied force. ASTM C 78-00 was followed in performing the test. The load was applied continuously and without shock to the breaking point when the loading point (l) was 133 mm distant from the supporting point (L). Applying the load will steadily raise the severe fiber stress at a rate of 1.21 MPa/min. The final step was calculating the intensity of the load in mega Pascal and the overall load in kilo newton. (Asrar Ul Haq, 2022)

In terms of cement pastes' loss of workability and first setting time, this study contrasts the impacts of newly created modified lignosulphonate superplasticizer with those of polycarboxylate and polynaphthalene superplasticizers. Both the pastes' actual viscosity and the yield stress loss of workability are tracked. The first setting was measured using heat development, rheological parameter change over time, and cement paste penetration depth. The linkages between these approaches were addressed. Different superplasticizer dosages were used to create cement pastes with yield stresses of 6 Pa at 30 minutes at specified water-to-cement ratios. The results showed that those pastes lost workability more gradually and had longer initial setting periods than those pastes without PLS. (Min-HongZhang,KritsadaSisomphon,Tze SiongNg,Dao JunSun, 2010)

2.3 Affecting Factors

1. The water-cementitious material ratio (w/cm), temperature, admixtures, and cement composition are the main determinants of setting time. Cement sets more quickly when it hydrates more quickly. Increases in the w/cm lead to longer setting times. As the temperature rises, the time of setting shortens. Depending on the kind, mixtures might shorten or lengthen the setting time.
2. Physical and Chemical Properties of Cement: The cement's physical and chemical characteristics have an impact on the strength and durability of the concrete. OPC cement is appropriate for dry climates without salinity or sulfate attack. PPC cement can withstand chemical attacks, making it ideal for undersea and water-retaining buildings. Another type of cement, called SRPC (sulfate resisting Portland cement), is resistant to sulfate attacks and is appropriate for use in buildings close to the coast. Concrete's physical and chemical makeup undoubtedly impacts how long it lasts.
3. Amount of Cement: The amount of cement also has an impact on the cement's strength. A fundamental factor in the strength of a concrete building when adding admixtures is the cement to water ratio. The strength of the concrete will be lessened if the cement ratio is less than the recommended ratio. The cement ratio should also not be increased to the recommended level because doing so will increase the distance between the cement and the coarse aggregate and weaken their binding.

2.4 Limitations & Parameters of Cement

The main factors that affect a target cement's quality were the subject of our study. We have six parameters: sulfur oxide content, magnesium oxide to calcium oxide, alkali oxides, and insoluble residues in heat loss.

- Sample disruption (in case of samples obtained from thin wall tube)
- Field stress conditions, either total or effective, are not accurately represented.
- Setting, both initial and final the first setting's minimum time is 30 minutes, while the final setting's maximum time is 600 minutes.

CHAPTER 3
METHODOLOGY

3.1 Introduction

There are various types of tests in cement which we in this study we plan to carry out normal consistency test, initial setting time test and compression test of cement mortar. To figure out how much water is needed to create a cement paste with a standard consistency, apply the "normal consistency or standard consistency test of a cement paste" test. Concrete must have enough time to harden before being transported, placed, and compacted. Delaying the hydration and hardening processes during the initial setting time is essential. The final setting time aids in the safe removal of shuttering or formwork. Until the final setting period, cement's chemical interaction with water was complete. The capacity of a material to withstand failure in the form of cracks and fissures determines its compressive strength. The greatest compression that the cement specimen can withstand without failing was measured in this test, as well as the impact force delivered to both faces of the mortar specimen composed of cement. It is possible to describe concrete's compressive strength as its ability to withstand loads before breaking. The compressive strength test is the most crucial of the numerous tests conducted on the concrete since it provides information about the properties of the material.

3.2 Collection of Raw Materials

3.2.1 Cement

There are different types of cement including We used the brands Shah cement, Bengal cement, Fresh cement, and Premier cement, all of which are offered in local Bangladeshi markets.

- **Shah Cement:** Shah Cement is the leading cement brand in Bangladesh for over 15 years. It’s a concern of Abul Khair Group; one of the largest group of companies in our country. The brand became the market leader during the first year of introduction and consolidated its leadership every year. Superior technology coupled with focus on quality and customer service has been at the core of its success. Shah Cement is the preferred brand of the most individual house builders as well as mega construction projects of the country.

Figure 3.1: Shah Cement

- **Bengal Cement:** Bengal Group of Industries developed their new diversification in the cement sector known as "Bengal Cement Ltd." in order to fulfill the local and global spontaneous development in demand for cement. As a result, the group built a top-notch factory with an annual production capacity of 1.4 million MT in Baradi, Narayanganj, which is 35 kilometers from Dhaka's city center. One of the cement plants in this country with the biggest production capacity is Bengal Cement Factory, which can currently produce 1.4 MT annually. The management has set a two-year goal of increasing production capacity to 2.0 million MT annually.

Figure 3.2: Bengal Cement

- **Fresh Cement:** Clinker accounts for 95 to 100 percent of the composition, whereas gypsum makes up 0 to 5 percent. Due to the very small proportions of alkalis, chloride, magnesia, and free lime in its composition, it produces concrete that is incredibly strong and durable. In a hostile climate, the almost nonexistent chloride content prevents concrete structures from corroding. Due to their great strength, cement is used much less while building concrete of grades M30, M35, M40, and M50, as well as precast segments.

Figure 3.3: Fresh Cement

- **Premier Cement:** All of its rivals are not rising as quickly as Premier Cement Mills PLC.Our company first began selling its products on March 12, 2004, with a single unit that could produce only 0.6 million tons annually. In November 2012, we added our third and fourth units, which together could produce 1.2 million tons annually.

Figure 3.4: Premier Cement

3.2.2 Water

The water has to be clean and water have to collect from the local fresh sources. We need to make sure that there is no dust or other in the water.

3.3 Test Programs

3.3.1.1 Normal Consistency Test

The definition of a cement paste's normal consistency (in terms of water content) is that consistency at which the vicat plunger may penetrate to a point 10 mm below the top of the vicat mould. The typical range of values is 22 to 30 percent of the dry cement's weight. Standard consistency is another name for normal consistency.

Normal consistency = (Weight of water added)/ (Weight of cement) x 100 %

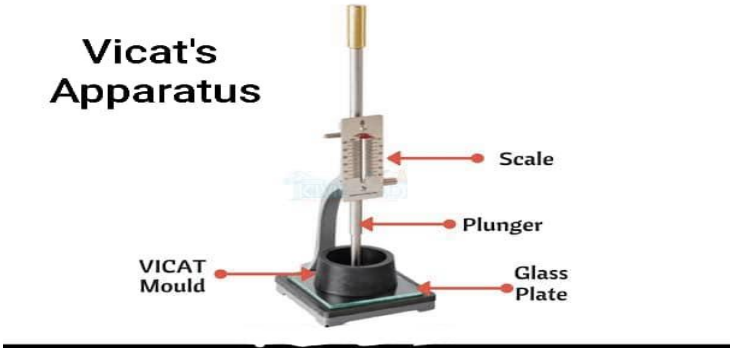

Figure 3.5: Vicat's Apparatus for Normal consistency

3.3.1.2 Apparatus

- Water
- Stopwatch
- Steel plate
- Spatula
- Vicat equipment
- And gauging trowel.

3.3.1.3 Procedure for Normal Consistency

Prepare a 300 gram sample of cement. Run numerous tests with various W/C ratios, then figure out how much water is needed for mixing. A mechanical mixer is used for mixing. Set the mixer's mixing position for the dry paddle and dry bowl. Then add the ingredients for a batch to the bowl and stir as follows: a. Fill the basin with all of the mixing water. b. Mix the cement with the water and give it 30 seconds to absorb the liquid. c. Switch on the mixer, then mix slowly for 30 seconds. d. Turn off the mixer for 15 seconds, and then scrape any paste that may have accumulated on the bowl's side into the batches. Turn on the mixer and mix for 60 seconds at medium speed. After the paste has finished mixing, it must be taken out of the bowl and squeezed into the large end of the Vicat mold. Place the large end down on a glass plate after removing the extra paste at the large end using a trowel. Use a single trowel stroke to remove the extra paste at the tiny end. Take caution to avoid compressing the paste while cutting and smoothing. Center the paste confined in the ring, resting on the plate, under the rod, the plunger end shall be brought in contact with surface of the paste and tighten the set screw. Set the movable indicator to the upper zero mark of the scale and release the rod immediately. The paste shall be of normal consistency when the rod settles 10 mm from bottom of mold in 30 seconds after being released. Draw the relationship between W/C and penetration for all trials. Construct the best fit line that pass through all points, then at 10 mm penetration, construct a vertical line that will intersect with the best fit line, then at point of intersection, a horizontal line is drawn that will intersect with y-axis which represents the standard consistency of that cement.

Figure 3.6: Procedure for Normal Consistency

3.3.2.1 Initial Setting Time Test

The phrase "first setting season of concrete" describes the period of time during which concrete has a chance to take on its perfect shape without sacrificing its strength. When concrete totally loses its ductility, it has reached its last setting season.

Figure 3.7: Vicat's Apparatus for Initial Setting Time Test

3.3.2.2 Apparatus

- Vicat's apparatus
- Balance
- Measuring cylinder
- Stop watch
- Glass plate
- Enamel tray
- Trowel

3.3.2.3 Procedure for Initial Setting Time

We use a regular consistency to determine the percentage of water to add to cement paste. Mixing shouldn't take less than three minutes and certainly not more than five. Following careful mixing, the paste is poured into the vicat mold, and the top surface is perfectly leveled. The square needle is then positioned underneath the mold and carefully lowered until it makes contact with the paste's surface. The square needle is now abruptly released, and its weight is allowed to sink into the cement paste. The square needle's level of penetration into the paste is recorded. Until the square needle is pierced to a depth of 25 mm from the top of the mould, the entire experiment is repeated with incremental time intervals.The Initial Setting Time of that cement is the period of time that passes between the addition of water and the instant the square needle pierces the mould at a depth of 25 mm. For regular Portland cement, the initial setting time should not be less than 30 minutes.

3.3.3.1 Compression Test of Cement mortar

Cement's compressive strength is determined 28 days after the curing time. Cement comes in four main varieties. For instance, Fresh Cement, Bengal Cement, Shah Cement, and Premier Cement. For making mortar, the proportion of cement to sand is 1:2, with one part being cement and two parts being sand. Use 0.55 water to all portland cement ratio throughout.

Compressive strength (MPa) = load / cross-sectional area

Figure 3.8: UTM machine for compression strength test

3.3.3.2 Apparatus

- UTM (Universal Tensile Machine)
- Cube mould size 2in x 2 in
- Vibration machine
- Balance 1000 g
- Measuring cylinder
- And other apparatus is used for cube test is Enamel tray, Trowel, Poking rod, Cement Mould.

3.3.3.3 Procedure for Compression Test of Cement mortar

Mix 500g of cement and 1000g of sand in a pan at a weight ratio of 1:2. The typical sand will be silt-free, of the walnut kind, and light, gray or whitish in color. The sand grains will soon be angular, with elongated and flattened grains present only in very small amounts. The shape of the grains will approximate a spherical form. Using a trowel, combine the cement and sand in a dry environment for one minute before adding water. The amount of water will be equal to (p/4+3)% of the total weight of cement and sand, where p is the percentage of water needed to create a paste with the previously specified standard consistency.

Figure 3.9: compression strength test of cement mortar

Figure 3.10: Measure the Sample

Figure 3.11: Types of Cement test Process

CHAPTER 4
RESULT AND DISCUSSION

4.1 Normal Consistency Test of cement

Table 4.1: Normal Consistency Test for Shah Cement

% of water	Amount of water (ml)	Penetration (mm)
28	84	8
29	87	10
30	90	12

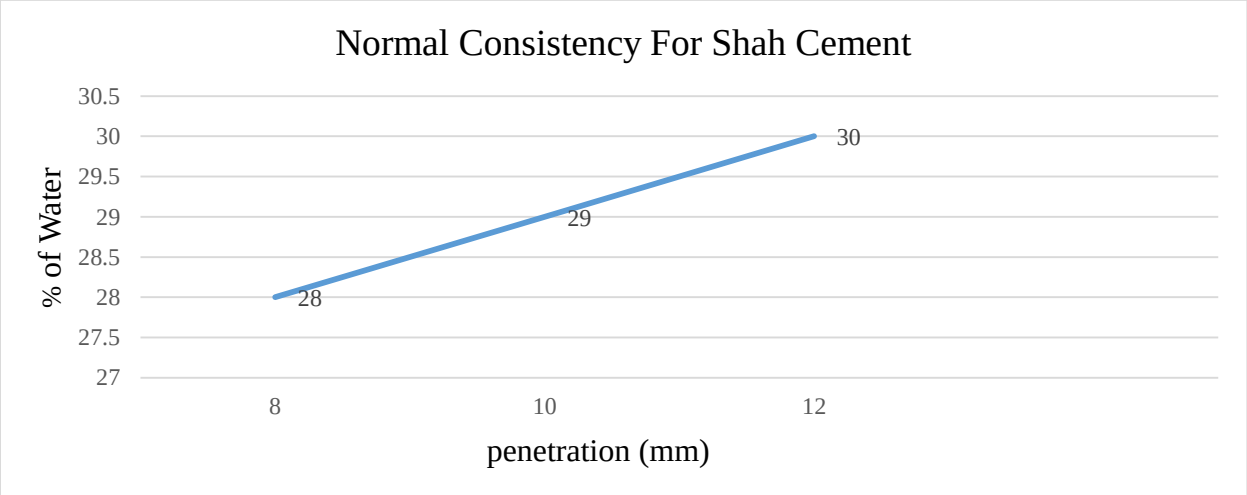

Figure 4. 1: Normal Consistency Test For Shah Cement

Table 4.2: Normal Consistency Test for Fresh Cement

% of water	Amount of water (ml)	Penetration (mm)
27	81	8
28.5	85.5	10
29	87	11

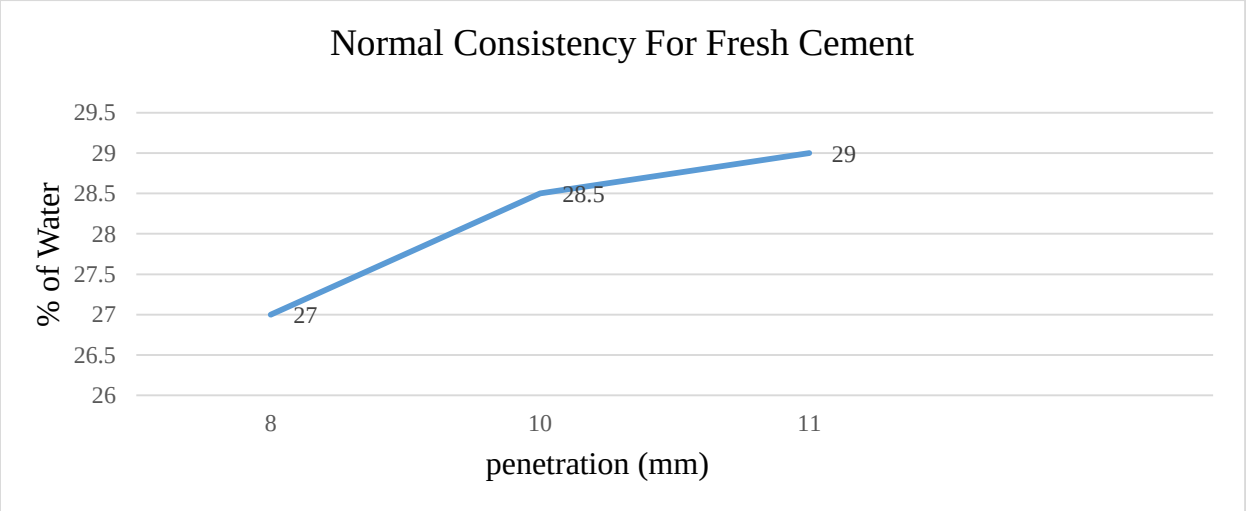

Figure 4. 2: Normal Consistency Test for Fresh Cement

Table 4.3: Normal Consistency Test for Premier Cement

% of water	Amount of water (ml)	Penetration (mm)
28	84	5
28.5	85.5	7
29	87	8
30	90	10

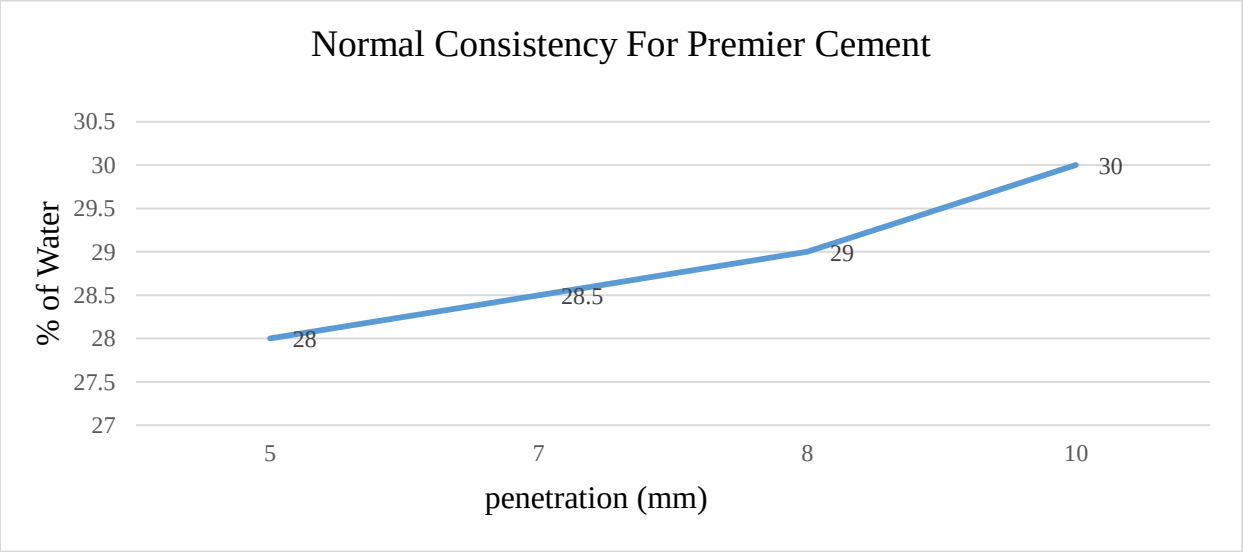

Figure 4. 3: Normal Consistency Test for Premier Cement

Table 4.4: Normal Consistency Test for Bengal Cement

% of water	Amount of water (ml)	Penetration (mm)
27	81	6
28	84	10
29	87	12

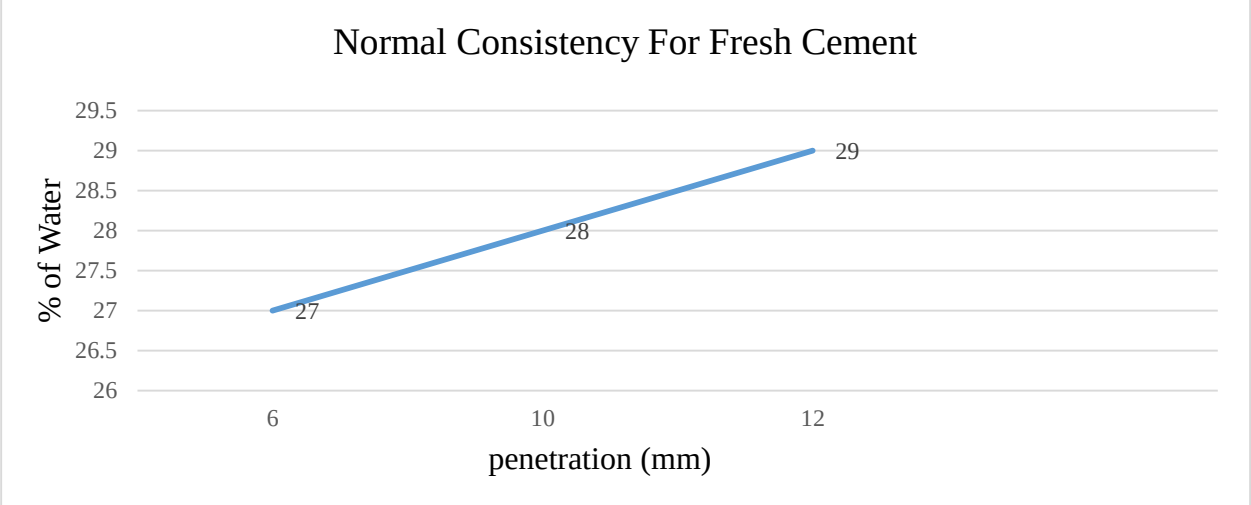

Figure 4. 4: Normal Consistency Test for Bengal Cement

Table 4.5: Normal Consistency Test for different types of Cement

Cement	Penetration (mm)	% of Water
Shah	10	29
Fresh	10	28.5
Premier	10	30
Bengal	10	28

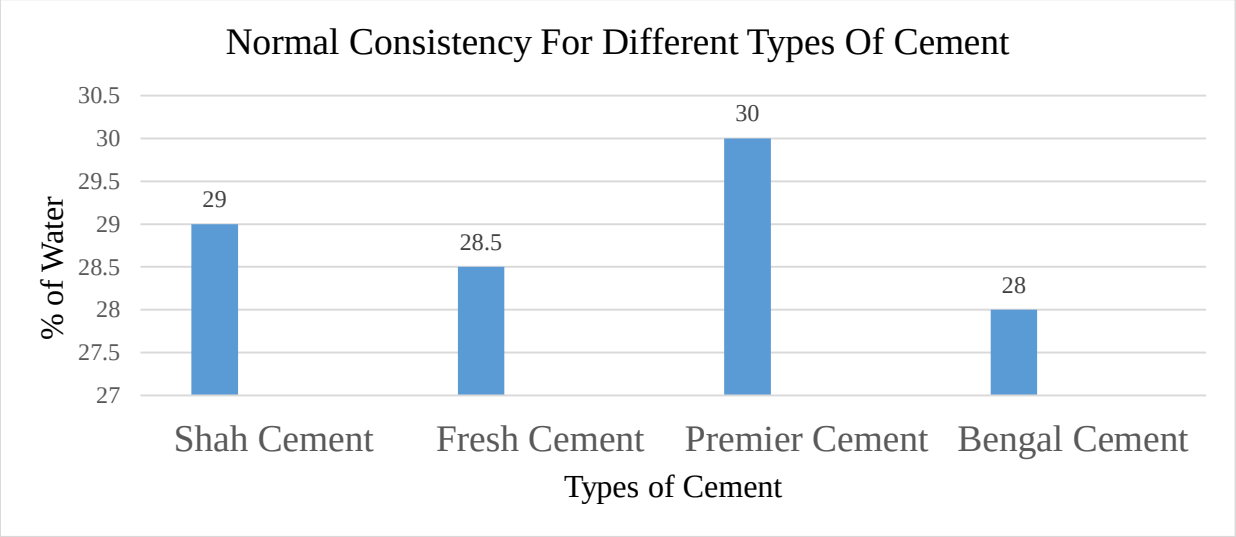

Figure 4. 5: Normal Consistency Test for different types of Cement

4.2 Initial Setting Time of Cement

Table 4.6: Initial Setting Time Test for Shah Cement

Time(min)	Penetration(mm)
15	10
30	11
45	11
60	11
75	11
90	11
105	11
120	16
135	25

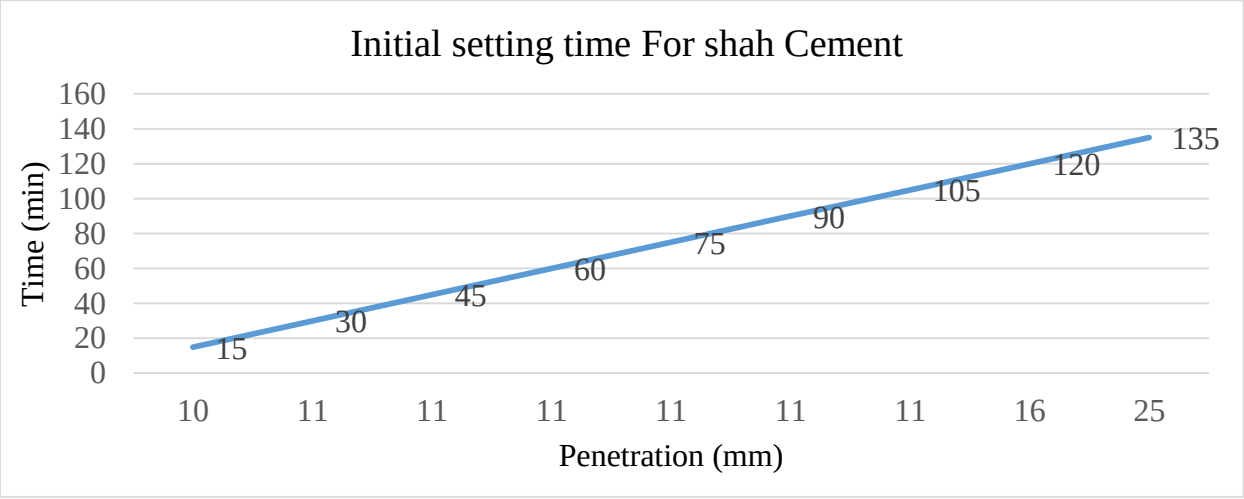

Figure 4. 6: Initial Setting Time Test for Shah Cement

Table 4.7: Initial Setting Time Test for Fresh Cement

Time(min)	Penetration(mm)
15	10
30	10
45	10
60	10
75	10
90	15
105	19
120	22
130	25

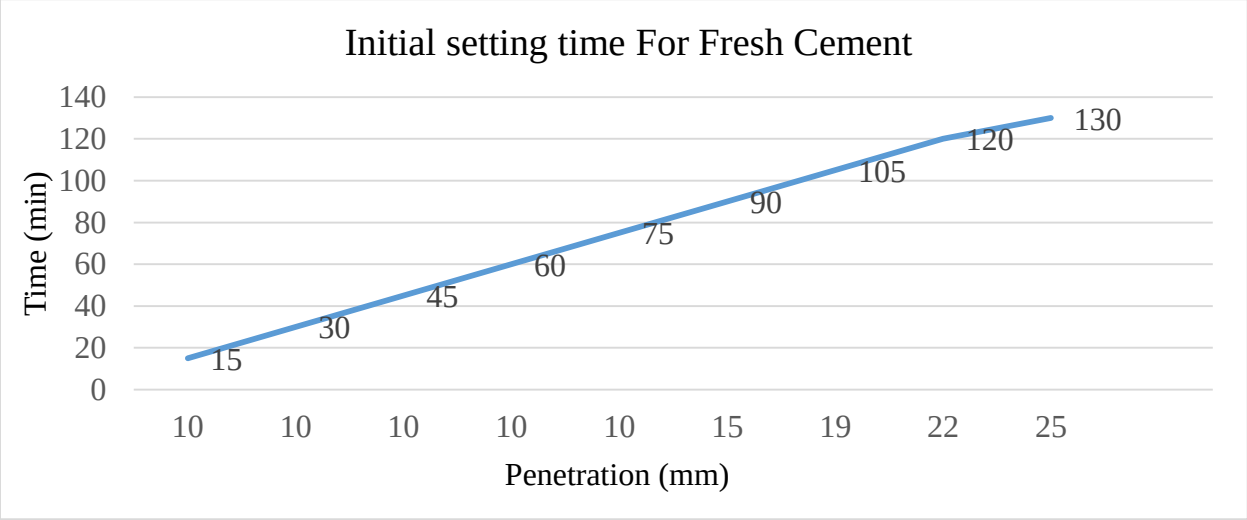

Figure 4. 7: Initial Setting Time Test for Fresh Cement

Table 4.8: Initial Setting Time Test for Premier Cement

Time(min)	Penetration(mm)
15	10
30	10
45	10
60	10
75	10
90	10
105	10
120	10
135	18
150	20
165	25

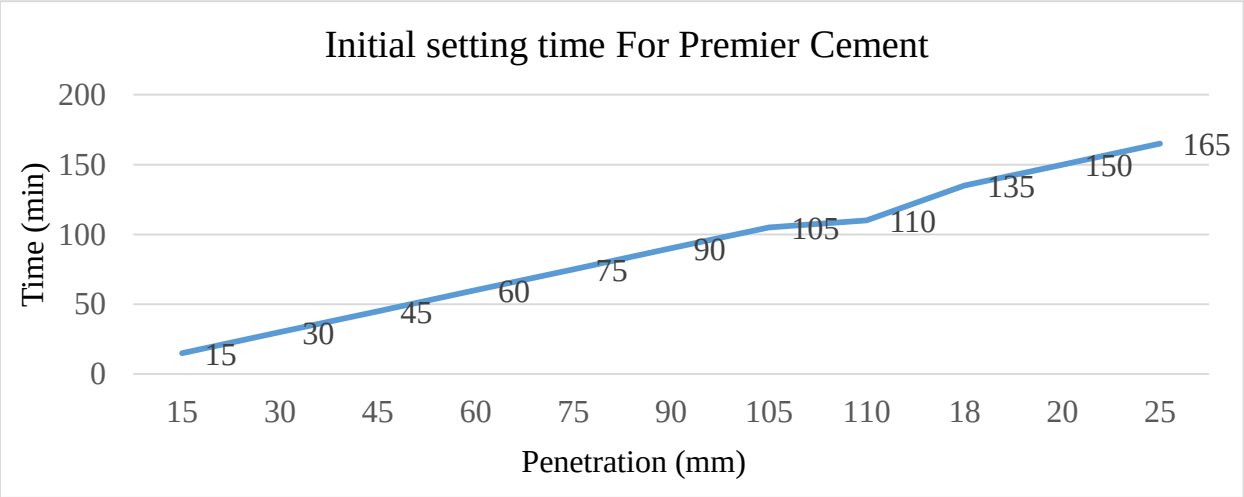

Figure 4. 8: Initial Setting Time Test for Premier Cement

Table 4.9: Initial Setting Time Test for Bengal Cement

Time(min)	Penetration(mm)
15	10
30	10
45	10
60	11
75	17
90	19
105	24
110	25

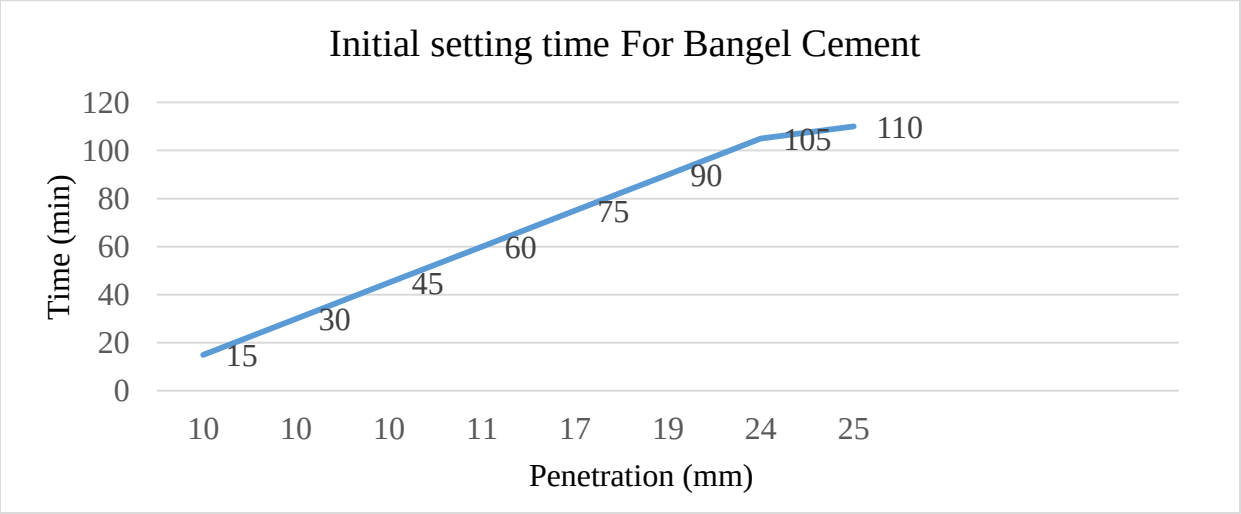

Figure 4. 9: Initial Setting Time Test for Bengal Cement

Table 4.10: Initial Setting Time Test for different types of Cement

Cement	Penetration (mm)	Time(min)
Shah	25	135
Fresh	25	130
Premier	25	165
Bengal	25	110

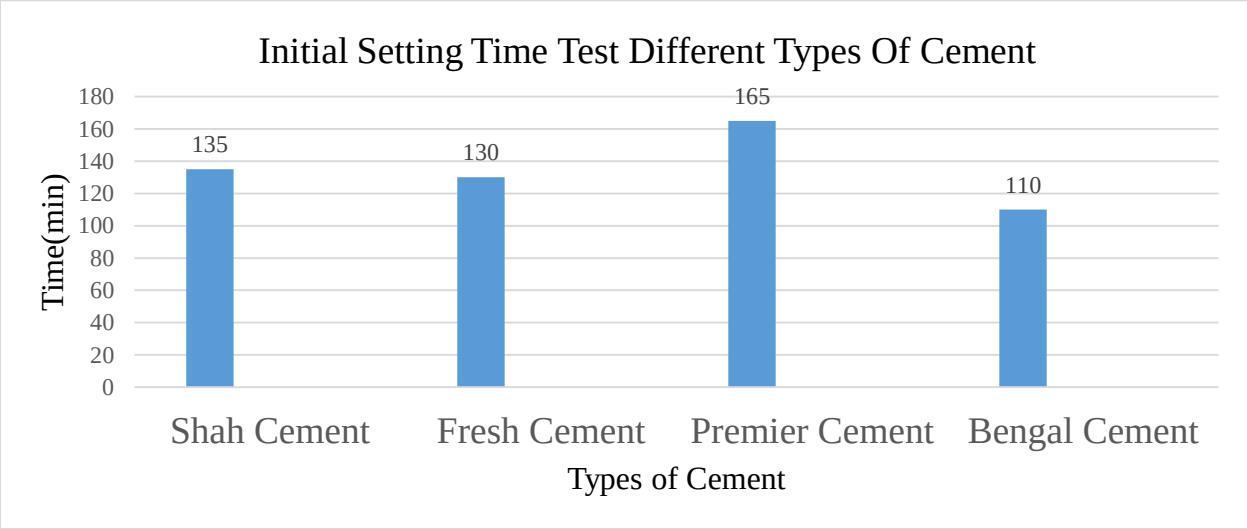

Figure 4. 10: Initial Setting Time Test for different types of Cement

4.3 Compressive Strength of Cement Mortar

There are different types of cement and are the compression strength test results of 28 days

Table 4.11: Compressive Strength of Cement Mortar for 28 Days

Cement	Specimen No	Crushing Load (KN)	Crushing Load (N)	Specimen Area (in^2)	Specimen Area (mm^2)	Compressive Strength (Mpa)	Average Compressive Strength
Shah Cement	1	68	68000	4	2580.64	26.35	28.28
	2	71	71000			27.51	
	3	80	80000			31.00	
Fresh cement	1	71	71000	4	2580.64	27.51	28.16
	2	72	72000			27.90	
	3	75	75000			29.06	
Bengal Cement	1	75	75000	4	2580.64	29.06	27.90
	2	69	69000			26.74	
	3	72	72000			27.90	
Premier Cement	1	52	52000	4	2580.64	20.15	20.15
	2	54	54000			20.92	
	3	50	50000			19.38	

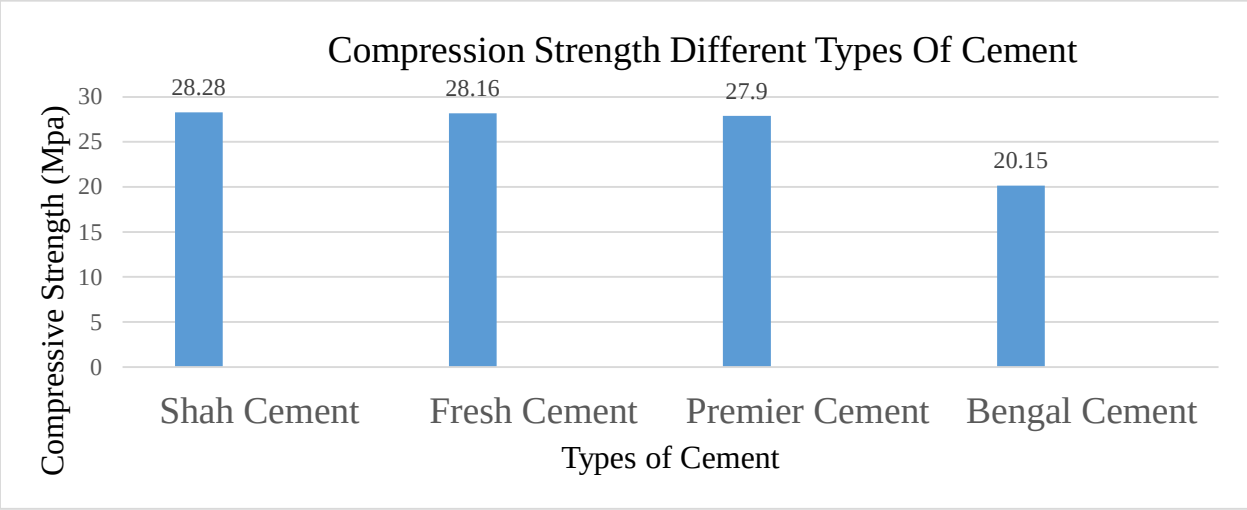

Figure 4. 11: Compressive Strength of Cement Mortar for 28 Days

4.4 Discussion

For Normal Consistency of cement production, Shah Cement uses 29% water, Fresh Cement uses 28.5% water, Bengal Cement uses 28% water, and Premier Cement uses 30% water. For the normal consistency test, the best results were found for Premier cement at 30% of water for (90 ml) and penetration 10 mm.

For the initial setting time of cement created, compare Bengal cement 110 minutes, Premier Cement 165 minutes, Fresh Cement 135 minutes, and Shah Cement 135 minutes. For the Initial setting time test, the best results were found for Premier cement at 30% of water for (90 ml), It took 165 minutes for penetration 25 mm.

28 days average compression strength of cement mortar made by Shah Cement was found to be 28.28 Mpa. 28 days average compression strength of cement mortar made by Fresh Cement was found to be 28.16 Mpa. 28 days average compression strength of cement mortar made by Bengal Cement was found to be 20.15 Mpa. 28 days average compression strength of cement mortar made by Premier Cement was found to be 27.90 Mpa. The highest strength of Shah Cement for 28 days compression test of cement mortar was found to be 28.28 Mpa.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5.1 Introduction

I have worked with cement of different companies in the current market of Bangladesh for normal consistency, initial setting time test, compression strength test of cement mortar, these tasks are not given much importance and I think these things are should done seriously.

5.2 Conclusion

The different type of cement available in local market in BD. The main focus is to find out the normal consistency test, Initial setting time and compression test of cement mortar.

- The best results were found for Premier cement at 30% of water for (90 ml) and penetration 10 mm.
- The best results were found for Premier cement at 30% of water for (90 ml), It took 165 minutes for penetration 25 mm.
- The highest strength of Shah Cement for 28 days compression test of cement mortar was found to be 28.28 Mpa.

5.3 Recommendation

We have worked with cement of four companies in the Bangladesh market, those who will work in the future will be able to work with cement of more companies, we have done three test work and it would be better if we do more test work. Those who will work in the future can do these jobs, such as Fineness Test., Soundness Test, Heat of Hydration Test, Tensile Strength Test, Chemical Composition Test.

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