CHAPTER – III
MATERIAL, METHODS AND PROCEDURES

This Analytical Study was conducted on selected Inter-University Soccer players from North Zone Universities, who participate in North Zone Inter-Varsity Football Championship which was held during October, 2008 at Patiala, Volunteered as subjects for this study.

3.1. Subjects:

The subjects volunteered for this study from different North zone Universities were 200 in number in all and their break-ups as per playing position and as per Universities are presented vide Table 1 and 2:

Table -1

Distribution of Subjects on the basis of Playing Position

<table>
<thead>
<tr>
<th>Sub-Group</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal Keeper</td>
<td>24</td>
<td>12.00</td>
</tr>
<tr>
<td>Defender</td>
<td>67</td>
<td>33.50</td>
</tr>
<tr>
<td>Mid Fielder</td>
<td>67</td>
<td>33.50</td>
</tr>
<tr>
<td>Striker</td>
<td>42</td>
<td>21.00</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>100</td>
</tr>
</tbody>
</table>
### Table- 2

**Distribution of subjects on the basis of University**

<table>
<thead>
<tr>
<th>Name of the University</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Punjabi University, PTA.</td>
<td>20</td>
<td>10.00</td>
</tr>
<tr>
<td>2. PAU Ldhiana.</td>
<td>18</td>
<td>9.00</td>
</tr>
<tr>
<td>3. Delhi Uni.</td>
<td>18</td>
<td>9.00</td>
</tr>
<tr>
<td>4. Luck. Uni.</td>
<td>18</td>
<td>9.00</td>
</tr>
<tr>
<td>5. Breli Uni.</td>
<td>18</td>
<td>9.00</td>
</tr>
<tr>
<td>6. PU Chandigarh.</td>
<td>19</td>
<td>9.50</td>
</tr>
<tr>
<td>7. GNDU Amritsar.</td>
<td>18</td>
<td>9.00</td>
</tr>
<tr>
<td>8. KUK KURUKSHETRA.</td>
<td>18</td>
<td>9.00</td>
</tr>
<tr>
<td>9. MDU ROHTAK.</td>
<td>18</td>
<td>9.00</td>
</tr>
<tr>
<td>10. AMU ALIGARH.</td>
<td>18</td>
<td>9.00</td>
</tr>
<tr>
<td>11. KU NAINITAL.</td>
<td>17</td>
<td>8.50</td>
</tr>
</tbody>
</table>

### 3.2. Methods:

The Research variables selected, tests selected to measure the variables, description of tests, procedures involved in conducting the tests and collection of data are presented:
### 3.2.1. Anthropometric variables selected:

a) Standing Height (body height),

b) Body Weight (body mass),

c) Leg length,

d) Knee diameter,

e) Thigh girth,

f) Calf girth and,

g) Skinfolds (Biceps, Triceps, Subscapular, Suprailiac)

### 3.2.2. Physical Fitness Parameters:

a) Explosive Strength endurance of legs (measured through five hops with both feet test, which is considered as a valid test for Indian population as many Indian researchers have used this test in their studies) Nagerkoti (1989),

b) Sprinting Speed (measured through 40 meters sprint test) Malhotra et al (1979),

c) Agility (measured through 6 x 10 meters shuttle run test) Subramanian (1981),

d) Endurance (measured through 2.4 Kilo-meters run on 400 meters track) which is validated against VO2 max on

e) Flexibility (measured through bend and reach test), Subramanian (1979).

3.2.3. Psychological variables selected:

a) Self-Efficacy

b) Anxiety

c) Self-Confidence

3.2.4. Soccer Skill tests, which were used by Van Rossum and Wijbenga (1993):

a) Ball control with the body (skill 1),

b) Ball control with the head,

c) Dribbling with a pass (speed and accuracy ),

d) Dribbling (speed),

e) Passing,

f) Shooting .

3.3. Description of Tests:

The detailed description of the physical fitness tests, psychological inventories and football skill tests selected for this
study including the lay-out, procedures etc. will be presented here.

3.3. 1. **Anthropometric Measures: (Figure- 1)**

The anthropometric measurements such as standing height, leg length will be measured using standard measuring rod, body weight were measured using standard weighing machine, knee diameter, thigh girth and calf girth will be measured using vernier caliber and skin folds will be also be measured using calibers and standard procedures.

**Standing Height (Stature):**

It is the vertical distance from the vertex to the horizontal floor. The Subject is asked to stand erect with both heels touching each other along a vertical wall. The hip and the upper scapular part must touch the vertical wall. In this position, the subject must stretch upward and look forward so that his visual axis is parallel to the axis of the floor. The anthropometric rod is held vertically in front of him in mid sagital plane and the horizontal movable arm is brought down or to the point vertex.
**Body Weight (Body Mass):**

Body weight is taken on a weighing machine with the subject clothed minimally, the accuracy of the machine is checked before the subject stands still in the centre of the platform and the reading is recorded. A portable person weighing machine has been used in this present study. The zero of the scale was checked before taking each measurement.

**Leg length:**

Leg length is measured using Anthropometric rod. It is the Vertical distance from the most superior point on the top of greater trochanter of the femur, which can traced by pressing the trochanter are with index and middle fingers when the subject is standing with the weight on the other leg, to the horizontal surface of floor. The subject is asked to stand erect with both heels touching each other along a vertical wall.

**Knee-diameter:**

It is the straight distance between the most medial and most lateral points of the lower end of femur. The subject is seated on the chair with the knee bent at a right angle, the
greatest distance between the lateral and medial epicondylar of the femur was measured with the slight pressure of the nob of sliding caliper on the cross bars placing at an angle 45° approximately.

**Thigh Girth:**

It is the circumference at a point half-way between the landmark trochanteron and femarale. The subject is asked to stand erect putting the equal weight on both feets, keeping apart. The tape is wrapped at half point of the left thigh.

**Calf Girth:**

It is the maximum circumference of the calf. The subject is asked to stand erect by keeping feet apart and weight distributed equally on both the feet. The steel tape is wrapped at the most medial point on the gastronomies of the left leg.

**Skin Folds:**

All the skin fold measurements were taken with the help of a Harpenden skin fold caliper. Some of the skin folds were taken exactly at the level from where the circumferences were taken. For every measurement, a fold of skin and sub-
cutaneous tissue was picked up firmly between thumb and forefinger at the left hand, about one centimeter above the mark made for the purpose and pulled away from the underlying muscle. The edges of the plates of caliper were then applied one centimeter below the fingers of the left hand and allowed to free the caliper edges to use full pressure before taking the thickness of the fold. The subject is relaxed at the time when skin fold was taken.

**Biceps Skin Fold:**

**Equipment required:**

Harpenden skin fold caliper of standard pressure of 10 gm/mm2.

**Procedure:**

This skin fold caliper was taken on the front of the arm at the level marked on the skin for the arm circumference and directly in line with the centre of the cubital fossa.
Triceps skin fold:

Equipment required:

Harpenden skin fold caliper of standard pressure of 10 gm/mm².

Procedure:

This skin fold was taken on the back of the arm at the level marked on the skin for the arm circumference and directly in line with the point of the elbow at the same level as that for the biceps skin fold. The reading is recorded with the help of Harpenden caliper,

Subscapular skin fold:

Equipment required:

Harpenden skin fold caliper.

Procedure:

This skinfold was taken just at the lower angle of the scapula in a diagonal direction obliquely downward and outward at 45°. The subject is asked to stand in the normal position.
Superailiac skin fold:

**Equipment required:**

Harpenden skin fold caliper.

**Procedure:**

It is taken one centimeter above the superior margin of iliac crest. Picked up the skin vertically and placed the caliper one centimeter below of the picked up point. The reading is noted down in between the unit of 0.1 mm.

3.3.2. Physical Fitness Tests:

a) **Five Hops with Right Foot and Five Hops with Left Foot (Figure-2):**

The purpose of this test is to assess the explosive strength endurance (leg power endurance) of the subjects.

**Equipment Required:**

Flat ground or athletic track, measuring tape and chalk.

**Description of the test:**

On the athletic track or on the barren flat ground, a line, which will be known as ‘starting line’ will be marked with chalk and the subject will be asked to take the position as close as
possible to this line without crossing it, assuming crouched position ready to hop forward on one leg (either with right leg or with left leg as fixed by the investigator). On the command ‘start’, the subject will have to shift his body weight on the take-off foot and make five hops with the same of take-off foot consecutively covering as much distance as possible while hopping. The subjects are to ensure that the free foot does not come in contact with the ground while hopping. The point at which the subject landed his foot at the end of the fifth hop will be marked by chalk. The shortest distance from the nearest point of landing to the outer side of the starting line will be measured to the accuracy of centimetres. Each subject will be given two trials for each leg with the rest interval of three minutes between trials. The distance covered for each trail will be noted down. The average distance of the two trails will be taken as the score for this test.
b) 40 Meters Sprint Test: (Figure-3)

The purpose of this test is to measure the speed and sprint ability of the subjects. The distance involved for this test is 40 meters.

**Equipment Required:**

A measured 40 meters flat running surface, one stopwatch with the possibility of measuring the time to the accuracy of 1/100 of a second.

**Description of the test:**

Two lines, parallel to one another, at a distance of 40 meters apart will be drawn on the flat ground or athletic track. One line will be the starting line and the other will be finishing line. The subject has to take the starting position behind the starting line standing as close as possible without crossing the line with one foot placed in front ready to sprint forward. The starter (helper) will take his position behind the subject and give starting signal by flagging his hand down from above head after the verbal command ‘ready–go’. The researcher will take his position on the side of the finishing line with the stop
watch. The researcher will start the watch on the starter’s signal (flagging the hand downward) and stop the watch as the subject crossed the 40 meters finish line with his chest. The time taken by the subject to sprint the 40 meters distance will be noted to the accuracy of one hundredth of a second. Each subject will be given two trials with the rest period of 3 minutes between trials so that the subject will be fully recovered from the physical stress due to first trial and is in normal resting condition before the start of the second trial. The average time of the two trials will be taken as the score of the subject for this test.

c) 60 Meters (6 x 10 meters) Shuttle Run: (Figure- 4)

The purpose of this test is to assess the agility of the subjects.

**Equipment Required:**

Flat ground or athletic track, measuring tape, chalk and stop watch.
**Description of the Test:**

Two lines parallel to each other at a distance of 10 meters apart are drawn on the flat ground or on the athletic track. The subject has to stand behind one of these lines, which is the starting line as well as finish line and on the command ‘go’, the subject has to start running towards opposite line and cross the line with both the feet and return to the start line and in this manner has to shuttle between two lines six times (3 times up and 3 times down) covering the total distance of 60 meters. The researcher will start the stop watch on the command ‘go’ and stop the watch at the moment the subject crosses the start line third time with both feet. The time taken in this shuttle will be noted to the accuracy of one hundredth of a second. Each subject will be given two trials with the rest interval of 5 minutes between trials. The average time for both the trials will be taken as the score for this test.
d) **2.4 K.M. run test to cover within shortest time possible:**

**Purpose:**

To measure basic endurance

**Organisation of the test:**

The test was administered in group of six to eight subjects at a time with one timekeeper for each runner.

**Procedure:**

On an audible signal, the subjects will start running close to inner edge of the track for six complete round. On completion of each round, the subjects will be informed about how many more rounds they are yet to complete.

**Scoring:**

The time taken to complete six rounds will be recorded up to $1/100\text{th}$ of seconds from the starting signal to the crossing of the finish line.

**e) Bend and Reach Test (Figure- 5):**

The purpose of this test is to measure the maximum range of forward flexion (bending) of the trunk and the stretch ability of the hamstring muscles.
**Equipment Required:**

A box having a maximum height of 45 centimetres or a stadium step having similar height, and a scale marked in centimetres.

**Description of the test:**

The subject was asked to assume a vertical standing position bare footed on the box or on the stadium step with toes of both feet close to each other and pointing in front at the edge of the box or of the step. The subject was to bend forward and downward and extend her hands downward along the side of the box as much as possible without bending her knees. Both the hands have to be kept parallel and at the maximum reach the hands have to be held for about two seconds. The point of maximum reach was noted and the distance between the edge of the box and the noted point was measured to the accuracy of one tenth of a centimetre and was taken as the positive score of the subject and if the subject was not able to reach up to the edge of the box or step, then the distance between the tip of fingers of the subject to the edge of the box or step was
measured with the scale and taken as the negative score of the subject. Every subject was given two attempts and the maximum reaching distance in positive score and minimum distance in negative score was taken as the subject’s score in this test.

3.4. **Psychological inventories:**

a) Sports confidence was assessed through Sports confidence questionnaire developed by Vealey et al (1998) and modified by WU and CHI (2000),

b) Self-Efficacy was assessed through Perceived Physical Self-Efficacy Questionnaire used by Ryckman et al (1982),

c) Level Competitive trait anxiety was assessed through anxiety inventory- CSAI developed by Martens (1982).

3.5. **Soccer skill tests (Suggested by Van Rossum & Wijbenga, 1993):**

a) **Ball control with the body (skill 1):**

Within a 9 x 9 m square, the player has to keep the ball in the air without using the arms or hands. The score recorded will be the number of hits of the ball before it fell to the floor.
Counting will be stopped when the ball hit the floor, the participant moved out of the square or he touched the ball with the arms or hands. One trial will be administered, although the participant could start the trial again if he failed to contact the ball three times in the initial attempt.

b) Ball control with the head:

Within a 9 x 9 m square, the player has to keep the ball in the air using only the head. The score recorded will be the number of hits of the ball before it fell to the floor. Counting will be stopped when the ball hit the floor, the participant moved out of the square or he touched the ball with any part of the body except the head. One trial will be administered, although the participant will be allowed to start the trial again if he failed to contact the ball three times in the initial attempt.

c) Dribbling with a pass (speed and accuracy):

Four cones will be placed in a line, 2.25 m apart, within the 9 x 9 m square, and a fifth mark, a flat surface such as a bench 1.2 m wide, will be placed on the end line. The participant will be instructed to dribble the ball around the first
four marks in slalom fashion, make a pass to the fifth mark and receive/control the ball, and dribble around the four marks back to the starting line. The objective is to complete the drill in the fastest time possible without knocking down the cones and without stepping out of the square, controlling the ball only with the feet. If a cone (mark) was knocked over, the participant has to place it upright and continue the test. Two stopwatches will be activated by the timers at the starting signal and will be stopped when the participant crossed the starting line. The average of the two values will be used in the analysis.

d) Dribbling (speed):

A cone will be placed on each corner of the 9 x 9 m square (four cones). A fifth cone will be placed midway (4.5 m) on the line of the square where the test began. Thus, the near end had three cones (one on each corner and the third midway) and the far end had two cones (one at each corner). Beginning at one corner, the athlete has to conduct the ball with the feet (dribble) around the three cones (corner directly opposite the starting cone, the cone placed midway, and the cone diagonally opposite
the starting cone) in slalom fashion, and then dribble the ball into the fifth cone (i.e. not with a pass). The objective was to complete the drill in the fastest time possible by controlling the ball only with the feet without knocking down the cones. If a cone was knocked over, the participant has to place it upright and continue the test. The overall slalom distance will be thus about 40 m. Two stopwatches will be activated by the timers at the starting signal and were stopped when the ball was dribbled into the fifth cone. The average of the two values will be used in the analysis.

E) Passing:

Five targets will be placed 2.5 m apart at the end line of the 9 x 9 m square. The athlete will be standing outside of the square at the opposite line of the target. Two attempts at each target will be allowed for a total of 10 attempts. The objective was to hit the targets with the kicked ball in succession from one to five; two attempts will be permitted for each target. The score will be the number of successful target hits; the maximum score possible was 10 points.
f) **Shooting:**

A 2 x 3 m goal will be set up at the end line of a 9 x 9 m square. The target will be divided by ropes into six sections. One rope will be placed horizontally between the posts at a height of 1.5 m. Two ropes will be dropped from the crossbar, 0.5 m from each post. Five points will be allocated for the upper right and left sections, and two points for the upper middle section. Three points will be allocated for the lower right and left sections, and one point for the lower middle section. While standing outside of the square at the opposite line of the goal, the player will be given five attempts at kicking the ball into the goal. The maximum score possible was 25 points.

**3.6. Procedures:**

All the subjects will be explained about the tests selected and also their procedures of performance and they will also be demonstrated in slow motion all the physical fitness tests and skill tests. All the subjects will be motivated to give their best performance in all the tests. The data collected will be analyzed using computer and the variation in mean score between and
among the subjects playing different playing positions will be analyzed applying ANOVA and test of statistical significance.