6. **Technological Study**

The stages of pottery manufacture include:

1. Procurement of raw material
2. Preparation of raw material
3. Forming
4. Finishing
5. Firing

Ceramics are composed of three basic raw materials: (a) clay, a sticky, fine-grained fraction of soil that attains plasticity when wet; (b) non-plastic materials, mineral and organic inclusions found naturally in clays or purposefully added to enhance or reduce the plasticity of clay and make it workable and also limit its shrinkage; and (c) water, added to the clays and inclusions to make them plastic and workable. Other materials like slips, glazes and pigments are also used at later stages of pottery preparation. Fuel wood is yet another raw material required for firing.

The term clay is defined as fine-grained earthy material that becomes plastic or malleable when moistened. Clays are a result of weathering and disintegration of pre-existing rocks. Clays are distinguished into two categories: (a) primary and (b) secondary. Primary clays are formed in situ (residual). Secondary clays are derived from original place and redeposited in a different environment (Rice, 1987). Primary or residual clays are generally coarse and include angular fragments of the parent material and mostly include quartz, mica and feldspar. They are also low in organic content and are of low plasticity.

Secondary or sedimentary clays are more common than the residual clays and are more homogenous. They are finer in texture than the primary clays, for they are
well-sorted during redeposition by external agencies. In comparison with the residual clays they have high organic content. These clays were utilized by early potters (Arnold, 1985). Variations in pottery making techniques and also forms of pottery should be viewed as having been influenced by the quality and nature of the raw materials (Sinopoli, 1991).

Clays can be defined on the basis of their chemical composition. Clays being the end products of weathering of rocks are primarily composed of silica and alumina, the two chemical elements most resistant to weathering. Clays are made up of mainly silicates, alumina and water in crystalline structures, although other minerals like potassium, sodium, calcium and iron occur in relatively smaller quantities (Rice, 1987).

Mineralogically, most clay minerals belong to the category of layered silicates or phyllosilicates. The strength of bonds between layers influences the plasticity of the different clay groups. They also vary in particle size, shrinkage and respond differently to different firing temperatures. The major clay mineral groups are kaolinite, montmorillonite and illite. Kaolinites occur as both primary and secondary clays and are formed because of intense weathering of the parent rock, due to acid leaching and are considerably wide-spread. Kaolinites have a two layered structure and their particle size is larger when compared to other mineral types. While the plasticity of sedimentary kaolinites is good, residual kaolinites have low plasticity and their shrinkage is low. Kaolinites fire to white or yellow colour. Smectites, formerly known as montmorillonites are characteristic of arid and alkaline environments and are not heavily weathered. The particle size of smectites is much smaller and they have a three layered structure. Smectites are very plastic and have a high shrinkage
rate. When fired smectites attain cream, red and light brown colours at different temperatures (Rice, 1987).

Illites occur generally in marine and calcareous sediments and have a three-layered structure. They have considerably good plasticity and small particle size. On firing, illites attain variable colours.

6.1 Procurement of Raw Materials

Procurement of raw materials is governed by various factors: while the availability of good, workable clay is the most important factor, social organization also plays an important role in modern pottery making societies. Ethnographic studies have been conducted by Arnold, Kramer, Rye and others to understand the aspects of raw material acquisition (Arnold, 1985; Kramer, 1979; Rye, 1981). Arnold (1985) is of the opinion that potters obtain their raw materials from sources close to home. Clays are procured from 1 to 6 km from the manufacturing site (Arnold, 1985). The mode of transportation employed plays an important role in the distance from which clay is obtained. Procurement of clay requires ranging between the site of manufacture and the source, excavation and transportation to the manufacturing site. Tempering materials are often transported from long distances in case of shortage in available raw material. Some locally available temper, like chaff, ash and grog are also used. Raw materials for decoration of pots like pigments, glaze, if not locally available, are also acquired from long distances. A number of factors influence raw material procurement like its availability, the quantity required, cost incurred in transporting the raw material and also importantly social and cultural perceptions of the materials (Sinopoli, 1991). Although ethnographic studies shed important light on this, it is important to remember that the nature of clay deposits undergoes
modification in short spans of time (Hema Achyuthan: Personal Communication, 2006). Ancient clay deposits can now be subsurface or extinct. The cultural perceptions of modern day potting societies cannot be completely applied to the Neolithic potting societies. The choice of clay by modern potters can be different since the pottery manufacturing technique has also changed from the Neolithic times. With the change in technique the choice of the type of clay as a raw material also changes. The clay deposits too could have been different from those of modern day but fundamentally, the Neolithic potters also acquired clay from not very distant sources.

6.2 Preparation of Raw Materials

Clays contain impurities like lithic and organic debris, which are removed in the initial stages. The extent of cleaning the clay depends on the technique employed and the thickness of the walls of pot. Coarseness of the clay does not interfere in making handmade pottery. Generally thick walled handmade pottery is made from coarse clay. On the other hand well levigated and very fine clay is needed for producing thin walled wheel-turned pottery (Rye, 1981). For example, the Southern Neolithic handmade pottery is coarse. It is observed that impurities are removed from clay either by sifting or by drying damp clays and then by pounding and sieving. A more elaborate technique of levigation where clay mixed with water is allowed to settle in a tank, to facilitate the settling of coarse impurities to the bottom and the fine clay mixed with water is separated.

In order to improve the workability of the clay and add strengthen the walls of the pottery, non-plastic inclusions are added to the clay. These include organic materials like ash, husks of grains, chaff, and inorganic materials like quartz, lime and
The proportion of these non-plastic inclusions greatly varies from 20% to 50% of the total volume (Rye, 1981). Apart from the non-plastic inclusions potters also combine clays from different sources to improve plasticity workability. Water is then added to the clay in order to make it plastic and then it is kneaded well. The kneading or blending of the clay is done to remove the air pockets and achieve homogeneity (Rice, 1987).

6.3 Forming

Forming of pottery can be done in two ways, hand-building and wheel-turned techniques. Since our study aims at understanding the Southern Neolithic pottery, which is handmade, emphasis is laid on the former. There are various ways pottery can be made employing hand-building techniques and often in the Neolithic times more than one method was used. The simplest among hand-building techniques is the pinching method, where a lump of clay is held in hand and from the center of the lump a hole is made into it. The walls are drawn using the thumb and fore-finger. This method can be used only to make small pots and walls of the pottery are uneven throughout the body (Rye, 1981; Rice, 1987).

The slab building technique is employed on both small and large pots with a non-round shape. In this method slabs of clay are joined together either by hand or with a paddle. Slab building technique also results in uneven walls (Rye, 1981).

Moulds are used as tools in one of the hand-building techniques. Stones, broken pots, baskets and the gourd are used as moulds. Prepared clay is plastered on either the interior or the exterior of the moulds and then dried to be separated. Moulded pots can be made either in a single piece or by joining pieces. This can be noticed archaeologically, either by the seam at the junction or the break which is more
likely to happen at the junction of two different parts. The mould technique is best suited to construct restricted pots with narrow mouth (Sinopoli, 1991).

The coiling technique is most common among hand-made techniques. Thin coils of clay are rolled horizontally on a flat surface. The diameter of the coils can range from 5mm to 10mm for thin-walled pots and to 5cm or more for thick walled pots. The length of the coil varies with the skill of the potter. The coils can be used to form the base or can be added on to a base formed by other techniques like pinching or moulding. The walls of the pots are built by placing the coils successively one on top of the other. The coils are moistened by the potter so that they adhere to each other. The joints of the coils are further smoothened by pressing with the fingers and/or with a wooden paddle or a smooth stone. Care is taken to adhere the joints of the coils because it is at these joints that the pots are more likely to break during drying, firing or use (Sinopoli, 1991). Ring building is a variant of the coiling technique. While coiling technique involves a spiral, ring building involves laying a series of circular coils on top of one another. The distinction between these two hand building techniques is difficult to make in archaeological assemblages (Rye, 1981). In both coiling as well as ring building techniques the wall thickness varies greatly. Regular horizontal “corrugations” can be noticed if the junctions or coil joints are not obliterated. A large number of sherds studied in this work both from the Neolithic and the post-Neolithic levels have evident signs of these corrugations and thus can be conclusively said to be built using the coiling technique.

Turntables are used by potters to slowly spin the pots to uniformly work on all the sides. More often than not more than one hand-building technique was employed and tools like smooth pebbles and sharp pointed tools were also used (Rye, 1981; Shepard, 1985; Rice, 1987).
Fig. 6.1: Corrugations resulting from Coiling Method.

Fig. 6.2: Finger impressions to smoothen the coils.
6.4 Finishing

There are different ways of finishing the surface of the pot. The forming stage gives the pot a basic form. A potter employs various finishing techniques, to shape the pot and also decorate it, such as the paddle and anvil technique, trimming, scraping, smoothing, shaving and turning.

The paddle and anvil method comprises the use of a rounded stone anvil and a wooden mallet shaped paddle. The anvil is held in the interior of the pot while the exterior is beaten by the paddle. This method is applied to pots when they are in a leather hard state. Although the clay is not plastic in the leather hard condition, its malleability is retained and so the pottery can be shaped. This not only increases the diameter of the pot but also makes the wall of the pot thin and compact. This also results in increasing the strength and also decreasing the porosity of the pot (Rye, 1981). This method can be used on pots built with both hand-building techniques like coiling or slab building and also on wheel thrown pottery. Paddle and anvil technique is mostly used in producing round-based pots, mostly cooking pots.

The bases of pots are sometimes required to be thick. Therefore, when the pot is in leather hard state finishing techniques like scraping, trimming and shaving are employed to attain the required thickness. Scraping involves removing quantities of clay from thicker areas with the help of a sharp stone or smooth edged potsherd in a perpendicular direction to the pot in order to make the pot considerably uniform in thickness. On the inner side of the pot scraping marks can be noticed. This technique is evident at the site of Sanganakallu as will be described below.

Trimming is a finishing technique involving cutting excess clay mostly from the exterior with a tool and shaving involves removing excess clay from the exterior leaving angular facets on the pot surface (Rye, 1981). Thinning of the pots can be
done by turning on a wheel. Each of the finishing techniques leaves distinct marks on the pot walls.

The above described finishing techniques are aimed at mainly shaping the form of the pot and not at the aesthetics of the pot. The finishing techniques which affect the surface finishing of the pot are smoothing, burnishing and polishing (Rye, 1981). None of these techniques involve the application of colour but uses a hard tool like a stone or a broken and round-edged potsherd in the process. The tool is rubbed against the surface of the pot and this does not alter the shape of the pot. It conceals the irregularities of the walls of the pot (Sinopoli, 1991). Smoothing is non-lustrous and leaves the surface with a uniform and matte texture. Burnishing leaves a lustrous effect on the surface of the pottery but the lustre caused by burnishing is irregular and the facets left by the burnishing tool on the surface can be noticed. Polished pots are uniform and highly lustrous and no traces of the tool can be noticed (Sinopoli, 1991). These surface finishing techniques reduce the porosity of the pot by aligning the clay particles on the surface.

Other finishing techniques like slipping and glazing change the colour of the pot surface. Slipping includes applying a thin and uniform coat of liquid clay all over the pot before firing. This not only alters the colour but also reduces the porosity of the pot. Surface finishing like smoothing, burnishing and polishing are also done on slipped surfaces. Glazing involves addition of fluxes during firing, which reduces the melting point of the metallic oxides that provide colour and glaze to the surface of the pot. Glazing like slipping reduces the porosity of the pot.

Decorative finishing techniques like painting, incising and appliqué designs are also seen in the Neolithic and later pottery. While painting involves using natural pigments to recreate animal, plant and geometric designs on the exterior of the pot,
incising is done with a pointed stylus-like tool on the surface of the pot. These finishing techniques are purely to enhance the aesthetic appeal of the pot and do not serve any functional purpose.

6.5 Firing

Firing is the final stage of pottery manufacture. Pottery that are formed are usually left to dry in shade for a few days in order to let the excess moisture that is retained in the clay fabric to evaporate. It is during this stage that the pots shrink and the non-plastic inclusions in the clay fabric reduce the shrinkage. The presence of non-plastic inclusions prevents the pottery from collapsing or warping. The pottery is dried before heat is applied to it to prevent the cracking and breakage of pots when the steam from excess moisture in the clay paste is released from the walls of the pot. Firing of pottery involves chemical changes of the clay body, resulting in a hard and durable product which can withstand repetitive heating and cooling. The fabric and appearance of the surface of pottery largely depends on three aspects, the maximum temperature attained during firing, the duration of firing process and firing atmosphere (Rice, 1987).

Pots can either be sun-dried or fired in open fires, in small pits or in bonfires, or in closed enclosures like kilns and ovens. Pots that are sun-dried are not durable and are very rarely found in archaeological contexts. Neolithic pottery is fired mostly in open-fires either in small-pits or bonfires. In open-firing, fuel is first laid out and the pots to be fired are placed directly on the fuel and are also covered with more fuel. The duration of the firing is short and so also the temperature that is attained in these open-fires is not very high. The pottery that is subject to open-air firing comes in direct contact with the fuel and fire and the heat is also unevenly distributed in an
open-air firing condition, resulting in fireclouds or mottled colours on pottery (Rice, 1987).

The pots that are fired at low temperatures are more porous and coarse (Sinopoli, 1991). According to Rice (1987), the short duration of firing in open-air is withstood by the Neolithic pottery because of their rather coarse texture. The large mineral inclusions in the clay paste increase the thermal shock resistance of the pot and thus can withstand the uneven and short firing episodes of open-fires (Rice, 1987).

The temperatures attained in open-fires are low and range between 600° and 850° C. The degree of temperature attained greatly depends on the fuel that is used. For instance fuels like dung, ash and certain types of wood when used can result in attaining temperatures of over 900° C (Rice, 1987). On the other hand Rye is of the opinion that although in open-fires hotspots are present, it is highly unlikely that temperatures rise beyond 1000° C (Rye, 1981).

A minimum temperature of 550° C is needed to produce pottery for attaining considerable hardness and durability. Many chemical changes take place at different temperatures during the firing process. The fabric or the clay paste which includes the clay minerals, water and the non-plastic inclusions are affected by different temperatures. The moisture that remains on the surface of the pot is removed when temperature reaches between 200° C and 300° C. Water that is chemically bound to the clay particles is lost at higher temperatures. When temperature reaches between 500° C and 600° C some of the inclusions in the clay like carbon, sulfides and carbonates and salts are lost. The pots shrink by about 15% or more of their original mass at these temperatures. Irreversible changes in the clay structure occur at 500° C and above. Clay minerals begin to decompose and the edges of the grains bond.
together by ion diffusion, which is known as 'sintering'. While kaolinite decomposes and restructures at 585°C, smectite attains the same at relatively higher temperature of 678°C (Rye, 1981). At 900°C clay minerals lose their structure and form new silicate minerals. Inclusions like quartz undergo major structural changes at 573°C, 867°C and 1250°C (Sinopoli, 1991).

When firing is complete, the pots are left to cool. Rapid cooling like rapid heating might result in breakage and cracking (Rye, 1981). The total time taken from the initial firing till the gradual cooling is considered as the duration of firing and this is critical for the hardness and durability of the pots. Rapid heating and cooling weakens the clay structure and can make the pot less hard.

The atmosphere of the firing context refers to the presence or absence of oxygen in the firing chamber. Oxidation takes place when there is presence of oxygen and the absence of oxygen causes reduction. The firing atmosphere along with the presence of organic matter in the clay paste affects the pot colour, porosity, shrinkage and hardness (Rye, 1981). In oxidizing conditions, the organic matter in the clay and the fuels are burnt and a light colour is achieved. In reducing conditions, carbon in the clay paste is lost and the carbon from the fuels is also deposited on the surface of the pots resulting in black or dark brown coloured surfaces.
In the present study, the marks on the surface of potsherds are studied and an attempt is made to understand the techniques involved in the manufacture of Neolithic pottery from Sanganakallu.

The process of making pots involves many stages, the first of which is the forming process in which the pot is given its basic form. Normally this stage of pottery making is not seen as a surface feature because the marks of this are either masked or erased by later processes like burnishing and smoothing. But pottery from Sanganakallu being handmade, the profile or the walls of the pottery are uneven and
are not of uniform thickness. This characteristic of the pottery has remained even after the later finishing processes are completed on the pottery.

The present study of pottery from Sanganakallu is mainly a technological study. This technological study was based on the surface features noticeable on both the exterior and interior surfaces of the potsherds. These surface features included both the results of deliberate efforts at finishing like burnishing and rustication and also the marks resulting from forming processes like scraping and shaving marks. All the diagnostic sherds were analysed in good detail and were photographed to build a comprehensive database. The bodysherds on the other hand were analysed in lesser detail, enough to give a good understanding of the various technical groups in the various levels of habitation.

6.6 Analysis of Diagnostic Ceramics

The technological aspects of the pottery were recorded in detail. The process of pottery making was broadly divided into three main stages. They were preform, roughout and surface finishing. Distinctive marks of preform and roughout stages are rare, the most common being faint traces of coiling. The evidence of coiling can be noticed in the horizontal corrugations. These ridges of coils placed one on top of the other can be identified by running ones finger softly on the walls of the pottery. It is more likely for a potsherd to be broken at the junction of two coils as these are the weak points.

But much evidence is seen for the final stage of finishing. These being on both sides of the sherd – exterior and interior. The exterior surface undergoes finishing treatments like burnishing, rustication, slipped, polishing and smoothing. The interior surface of the sherds bears marks mostly resulting from the roughout stage. More
specifically, they are marks resulting from shaping the pottery in the leather hard stage of drying. The various means of shaping pottery are by

- smoothing with a hard tool to erase marks of pinching at coil junctions.
- scraping with a hard tool to make the walls of the pottery thinner.
- smoothing with a soft tool leaving ‘lissage’ marks (these marks resemble those resulting from smoothing the walls of the pottery with fingers when the clay is wet).
- paddle and anvil marks.

The regularity of the thickness of the sherd in profile is noted to determine the nature of forming. In handmade pottery, the walls of the pot are irregular. Irregularity can be horizontal, mostly due to the coiling method of pottery making. Random irregularity results from the pinching method of pottery forming or also from joining the coils. Regular profile indicates not only wheel-turned pottery but also handmade pottery which has undergone shaping through some rotatory movement.

Decoration was noticed on a considerable number of sherds. Various types of decorations seen on pottery include painting, appliqué of coils with impressed finger impressions, incised lines. Red paintings are common on burnished pottery, mainly on the lip. A few sherds with either dark brown or black painting were noticed. A brief description of the localization of decoration, its technique and the motif is given below.

6.7 Analysis of Bodysherds

The above described recording is done on the rims and other diagnostics like bases, spouts and decorated potsherds, from the various contexts of all the phases of
habitation on Sannarachamma and Hiregudda hills. A less detailed method was employed for analyzing body sherds.

The body sherds were sorted into various technological groups. Technological groups were identified on the basis of surface finishing. Each technological group had its own set of characteristic surface finishing. The surface finishing employed was mainly either burnishing, or rustication or application of a slip.

6.8 Technological Groups

The pottery assemblage from Sanganakallu was sorted out into various technological groups with a view to record the differences in good detail. This section includes the description of the technological groups. Broadly sixteen Groups designated A, B, C, D, D.a, E, F, G, H, I, I.a, J, J.a, K, L and M have been recognized.

Pottery belonging to the technological group A are burnished on the exterior surface and the interior surface remains unburnished. Smoothing marks can be noticed on the interior and these marks are affected by a hard tool on a leather hard surface. The smoothing is done to make the walls of the pot more uniform and also erase the differences in the thickness of the coils and their junction. Both the burnishing and the smoothing actions on the pot have resulted in reducing the porosity of the pot. Broken potsherds with rounded edges were possibly used as the hard tool for smoothing purposes.

The potsherds belonging to Group B are burnished both on the external and internal surfaces. The burnishing on the exterior surface seems to have been apparently performed with a wet stone. The internal surface exhibits faint marks of smoothing with a hard tool, noticed on some sherds due to burnishing. The exterior surface of the pottery belonging to Group B exhibits a lustre that is usually seen on
Fig. 6.4: Group A (External Surface) from Main Ashmound Phase

Fig. 6.5: Group A (Interior Surface) from Main Ashmound Phase
Fig. 6.6: Group B (External Surface) from Main Ashmound Phase

Fig. 6.7: Group B (Internal Surface) from Main Ashmound Phase
pottery that is self slipped. This is an indication of the possibility that the tool used for burnishing could have been a wet stone or pebble. The wet stone causes the surface to get moist when the pottery has attained the leather hard stage and causes a self slip effect.

Pottery belonging to Group C have unburnished exterior surface, while the interior walls of the pottery are burnished. The walls of pottery of this group are thinner than those of Group A and like Group A pottery they also have smoothing striations on the inner surface made from a hard tool that is broken potsherds with rounded edges.

Group D includes pottery which has both the exterior and interior surfaces unburnished. Group D.a is a variant of Group D with the interior surface being coarse and the external surface of the pottery being unburnished like those of Group D.

Group E includes sherds which have a coarse surface on the exterior and the interior surface betrays smoothing with a hard tool, the potter’s tool being a potsherd with ground edges. This group corresponds to the rusticated ware described by Allchin in Piklihal (Allchin, 1963).

Group F includes the Red Slipped Ware. The exterior surface of the sherds belonging to this group have a red slip and smoothing marks made from a soft tool, seen on both outer and inner surfaces. The smoothing marks on the exterior surface are parallel, horizontal striation marks, while the smoothing marks on the interior surface differ in their orientation. The smoothing marks are effected perpendicularly to the pot. The soft tool used for this purpose is hard to identify and could possibly be either fibrous matter or even potters fingers. On some sherds ‘lissage’ marks that are caused by smoothing with the help of fingers can be seen. The regularity of these marks is sometimes considered to have occurred due to wheel throwing. But these
Fig. 6.8: Group D (External Surface) from Main Ashmound Phase

Fig. 6.9: Group D (Internal Surface) from Main Ashmound Phase
Fig. 6.10: Group E (External Surface) from Post Ashmound Pitting Phase

Fig. 6.11: Group E (Internal Surface) from Post Ashmound Pitting Phase
Fig. 6.12: Group F (External Surface) from Post Ashmound Pitting Phase

Fig. 6.13: Group F (Internal Surface) from Post Ashmound Pitting Phase
marks occur when the pot is simply rotated by hand. A simple rotatory movement made by turning the pot when accompanied by such finishing activities like smoothing with a soft tool or even smoothing with fingers result in such regular striations (Roux, 1994).

The sherds of Group G have rusticated exteriors and are burnished on the interior surface. This is considered to be a variant of Group E because of the similarities between the two and also the strikingly small number of sherds in this group.

Group H includes pottery with a red slip on the exterior which has attained a dark reddish brown hue mainly due to oxidizing firing conditions. The interior surface of the potsherds has smoothing striations with a hard tool.

Group I potsherds belong to Black and Red Ware. While both the surfaces are slipped the exterior surface attains a red colour and the interior attains a black colour due to different firing conditions. Both the surfaces are very well burnished almost to the extent of being polished. Group I.a is a variant of Group I. Like Group I both the surfaces are slipped and burnished. But in Group I.a the exterior surface shows a reddish brown colour and the interior surface is brown unlike the black interior of Group I.

Group J includes pottery with a Red Slip on both the exterior and interior surface and a polished exterior surface with very faint traces of smoothing marks from a soft tool. The interior surface of the pottery of this group has been smoothed with a soft tool. A variant of Group J is Group J.a which like the former has Red Slip on both the exterior and interior surfaces. Unlike Group J, its variant Group J.a has no polishing on the exterior and both the exterior and interior surfaces have smoothing striations from a soft tool. The regularity of the striations occurs from rotatory movements either by hand or on a simple turn table.
Fig. 6.14: Group H (External Surface) from Terminal Occupation Phase

Fig. 6.15: Group H (Internal Surface) from Terminal Occupation Phase
Fig. 6.16: Group I (External Surface) from Late Occupation Phase

Fig. 6.17: Group I (External Surface) from Late Occupation Phase
Fig. 6.18: Patapadu Ware (External Surface) from Post Ashmound Village Phase.

Fig. 6.19: Patapadu Ware (Internal Surface) from Post Ashmound Village Phase.
<table>
<thead>
<tr>
<th>Technological Group</th>
<th>Exterior Surface</th>
<th>Interior Surface</th>
<th>Exterior Marks</th>
<th>Interior Marks</th>
<th>Other Marks</th>
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<tbody>
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<td>A</td>
<td>Burnished</td>
<td>Unburnished</td>
<td></td>
<td>Smoothing striation resulting from a hard tool</td>
<td></td>
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<tr>
<td>B</td>
<td>Burnished</td>
<td>Burnished</td>
<td>Burnishing on exterior could be done using a wet stone</td>
<td>Faint marks of smoothing striations from a hard tool</td>
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<tr>
<td>C</td>
<td>Unburnished</td>
<td>Burnished</td>
<td></td>
<td>Smoothing striation similar to A although much thinner than A</td>
<td></td>
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<tr>
<td>D</td>
<td>Unburnished</td>
<td>Unburnished</td>
<td></td>
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<tr>
<td>D.a</td>
<td>Unburnished</td>
<td>Coarse</td>
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<tr>
<td>E</td>
<td>Coarse or Rusticated</td>
<td>Smoothing with a hard tool</td>
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<td>F</td>
<td>Red slip Smoothing with a soft tool</td>
<td>Smoothing with a soft tool</td>
<td>Parallel horizontal striation</td>
<td>Perpendicular striations</td>
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<td>G</td>
<td>Rusticated</td>
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<tr>
<td>H</td>
<td>Red slip turning to dark brown</td>
<td>Mostly oxidized</td>
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<tr>
<td>I</td>
<td>Red slip burnished</td>
<td>Black and red ware</td>
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<tr>
<td>I.a</td>
<td>Reddish-brown Slipper Burnished</td>
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<tr>
<td>J</td>
<td>Red slipped</td>
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<td></td>
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<tr>
<td>J.a</td>
<td>Red slipped</td>
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<tr>
<td>K</td>
<td>Slipped</td>
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<tr>
<td>L</td>
<td>Red slipped Unburnished</td>
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<tr>
<td>M</td>
<td>Black polished</td>
<td>Wheel thrown</td>
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</table>

Table 6.1: Technological Groups and their description
Group K includes sherds that are slipped on the exterior surface and carry smoothing striations on the interior surface. The striations are regular and have resulted from smoothing with a soft tool along with a rotatory movement. The sherds of this group are slipped on the exterior but there is no evidence of burnishing.

Group L have a Red Slip on both exterior and interior surfaces and both the surfaces are unburnished. The number of sherds belonging to this group is very few which suggest that this is a minor technological group or probably even a variant of Group J.

Group M includes sherds which are most evidently thrown on the wheel and are black slipped and very well polished.

The Neolithic sites from the Kurnool – Cuddapah region have a distinct pottery assemblage typified as the Patapadu Ware. The Patapadu Ware first noticed by Allechin (1962) is handmade and also slipped. The pots belonging to this ware have paintings on the surface of dark purple to brown colour pigments. The pottery of this ware is slipped with pale red to pinkish-orange slip. The designs are mostly effected on the rims and exterior of restricted vessels and on the rim and interior of unrestricted vessels. The horizontal corrugations of the coiling and also the smoothing marks can be noticed on the Patapadu Ware. The pottery of this ware from the Neolithic sites Rupanagudi and Balijapalle are slipped and burnished on the external surface and exhibit slight differences in the internal surface. Based on this three technological groups can be noticed in the pottery of this ware. Pottery belonging to the technological Group P1 are slipped and burnished on both external as well as internal surfaces. Those belonging to the Group P2 have slipped and burnished external surface and have smoothing marks with a soft tool on a slipped internal
surface. The technological Group P3 is characterized by a slipped and burnished external surface and an unslipped and burnished internal surface.

<table>
<thead>
<tr>
<th>Technological Group</th>
<th>Exterior Marks</th>
<th>Interior Marks</th>
<th>Exterior Marks</th>
<th>Interior Marks</th>
<th>Other marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Slipped and Burnished</td>
<td>Slipped and Burnished</td>
<td></td>
<td></td>
<td>Paintings on both the surfaces</td>
</tr>
<tr>
<td>P2</td>
<td>Slipped and burnished</td>
<td>Slipped</td>
<td></td>
<td>Smoothing marks with a soft tool</td>
<td>Paintings on mostly exterior</td>
</tr>
<tr>
<td>P3</td>
<td>Slipped and Burnished</td>
<td>Unslipped and burnished</td>
<td></td>
<td>Paintings on probably both the surfaces.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.2: Technological Groups of Patapadu ware and their description

### 6.9 Decoration

Many forms of decoration can be seen on the pottery from Sanganakallu-Kupgal Neolithic site complex. Paintings in red, black and white and red can be noticed on the pottery mostly the rims. Decorations such as appliqué, incised lines, finger impressed coils on the exterior of the pottery and also rims are also noticed. From the chart, it can be seen that there is a greater complexity of decoration and the number of sherds also increases in the later phases like Post-Ashmound Village Phase and Terminal Occupation Phase. No decoration has been noticed in the Initial Ashmound Phase but examples of painted sherds are recovered from the Main Ashmound Phase.
Fig. 6.20: Decoration -Types and Occurrence
6.10 *Potter’s Tool*

Edge ground circular to oblong potsherds have been noticed by researchers working on the Southern Neolithic. Twelve specimens are known from Kannekolur-1 and 2, Budihal, Bijaspur and Budihal-S (Paddaya, 1973: 56). Sixteen specimens have been recovered from Kodekal ashmound by Paddayya (1973: 56, 69) and are suggested to have been used as scrapers for cleaning pottery. Subbarao (1948) mentions their presence at Sannarachamma and has suggested their use as hopscotches. These have also been interpreted as sharpeners and toys. It is necessary to distinguish these from spindle-whorls which are edge-ground too but have a perforation in the centre.

Allchin (1960) while describing the shaping of vessels in the Neolithic, particularly those of the A3 ware of Piklihal, has noticed scraping marks on the inner surface of the sherds. According to him, these were results of scraping when the clay was in leather hard state and that the scraping marks were mostly short and irregular and only in a few instances the scraping was accompanied by a rotatory movement. In view of this, the edge ground potsherds found from Sannarachamma and Hiregudda were suspected to have been used as scrapers to smoothen the walls of the pottery during the finishing stage of production. They also helped to erase the joints of coils and also reduce the unevenness of the pottery walls. This was tested during our experiments which have been described in the Chapter 11 on Ethnographic Study.
Fig. 6.21: Occurrence of Potter’s Tools

Twelve edge ground potsherds were recovered from the site complex. Of these four edge ground sherds from Main Occupation Phase and two each from Late Occupation and Terminal Occupation Phases at Sannarachamma belong to Group A (above). An edge ground potsherd belonging to Group D was recovered from the Main Ashmound Phase at Sannarachamma and also Post Ashmound Village Phase at Hiregudda.
Fig. 6.22: External Surface of a Potter’s Tool from Main Ashmound Phase.

Fig. 6.23: Potter’s Tool from Main Ashmound Phase.
Fig. 6.24: Ground Edge of a Potter’s Tool from Main Ashmound Phase.

Fig. 6.25: Marks resulting from scraping with the Potter’s Tool.