"Causes and Consequences of changing urbanization patterns in Nashik Municipal Corporation, Maharashtra".

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GEOGRAPHY

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Submitted By

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Under the Guidance of

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DECLARATION

I hereby declare that the thesis entitled **"CAUSES AND CONSEQUENCES OF CHANGING URBANIZATION PATTERNS IN NASHIK MUNICIPAL CORPORATION, MAHARASHTRA"** has been completed and written by me. The present research work has not previously used for the basis of the award of any degree or other similar title of this or any other University or examining body.

Place: Pune **Miss. Pawar Yogita Ashok**

Date: Research Student

CERTIFICATE

This is to certify that the thesis entitled **"CAUSES AND CONSEQUENCES OF CHANGING URBANIZATION PATTERNS IN NASHIK MUNICIPAL CORPORATION, MAHARASHTRA"** which is being submitted herewith for the award of the Degree of Vidyavachaspati (Ph. D.) in Geography of Tilak Maharashtra Vidhyapeeth, Pune is the result of original research work completed by **Miss. Yogita Ashok Pawar** under my supervision and guidance. To the best of my knowledge and belief the work incorporated in this thesis has not formed the basis for the award of any Degree or similar title of this or any other University or examining body.

Place: Pune

Date:

Dr. S. G. Joshi

Research Guide

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Place: Pune

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CONTENT

ABSTRACT

Causes and Consequences of changing urbanization patterns in Nashik Municipal Corporation, Maharashtra

The process of urbanization has a long history. It was originated during the pre-historic period when man started domestication of plants and animal around 10,000 years ago. The story of urbanization in India first briefly studied in the developement of indus valley civilization dating back to 2350 B.C. these urban development covered the area of indus valley and the some parts of Punjab, Rajastan and to some extent western Uttar Pradesh. Urbanization is a product of demographic explosion and migration of rural-urban and poverty induced. The increase in the proportion of the population residing in towns brought about migration of rural populations into towns and cities.

The research work under various titles such as urbanization of the city, Origin and evolution, planning Areas of the city is land of towns has been done by government agencies as well as at individual levels for Nashik Municipal Corporation.

The million cities in the third world started growing very rapidly after 1960s, Nashik city developed under historical and religious factors. The small religious center became an administrative headquarters in the British rule, with western type of development and its spatial growth. Nashik also became an important educational center and a service center in the western part of Maharashtra and major social, commercial, strategic institutes around Nashik city. Transportation system is developing in Nashik city. The railway line is connected with an imperial road to the Nashik city.

As per the above aspects Nashik city has been selected and studied in urban Geography. Besides these researcher belongs to the study region to know the various functions and service activities in details. The researcher also knows the problems of study region.

The Nashik city is situated in the State of Maharashtra, in the northwest of Maharashtra; on Latitude coordinate 19° 58' 59" North to 20° 04' 30" North Latitude and Longitude coordinate 73° 41' 30" East to 73° 52' 0" East longitude. It is connected by road to Pune (220kms) and Mumbai (185kms.). Rail connectivity is through the central railway, connected with Mumbai and air connection is with

Mumbai, the air service is not consistent and a proper airport does not exist. This geographical location, the city naturally started growing westward between the two main rivers, the Godavari and the Nasardi, towards Anandvalli, Gangapur and Satpur area.

It is popularly known as the "Grape City" and for its twelve yearly 'Sinhasta Kumbh Mela'. It is located in the Western Ghats on the banks of river Godavari, and has become a center of attraction because of its beautiful surroundings, cool and pleasant climate.

There are many causes which lead to urbanisation but all causes can't be explained. So some important causes are explained as follows.

1) Historical background of the city leads to set up urbanisation within the city.

2) Healthy atmosphere, Good weather condition lead urbanisation of the city.

3) Due to unpredictable weather and unpredictability of production of crops and use of new technology in agriculture industry, many people from agricultural sector migrate to the cities for employment opportunities in various sectors.

4) Establishment of large scale of industries tends to migration people from rural areas to cities for employment opportunities.

5) Establishment of Central Business District (C.B.D.) is also a cause of urbanisation.

6) Availability of Various social amenities like school, Hospital, Gardens, and Roads etc. also attracts people towards cities to improve their life style.

7) Some part of the city, which offers high standard life style, also attracts people to improve their life style.

8) Good transportation network also lead urbanisation of city.

9) Enough availability of urban needs within the city also leads urbanisation.

Causes of urbanisation which explained as above attract some consequences which are introduced as follows.

Causes of urbanisation, as discussed above have results some consequences mentioned as follows.

1) Due to historical background urbanisation increases but it also leads to increased population density, decreased literacy rate, increased sex ratio, and increased tourism.

2) Healthy atmosphere and good weather condition leads population density, decreased sex ratio, limited provision needed for service provider authority, reduces water demand and electricity demand.

3) Migration of people from agriculture sector to urban sector leads unemployment in agriculture sector, Lack of youth employment in agriculture sector, lowers the income of depending family as well as economy in rural areas.

4) Industry leads to urbanization but it also increases population, Sex ratio, density of population.

5) Central Business District increases various things likes land cost, market cost, Rent value, establishment of different types of commercial hub, stress on service provider authority, rates of urban needs, population density, banking amenities, education amenities and health amenities.

6) Educational and Hospital amenities lead to generate employment of that sector and related business.

7) A high-end life style increases various taxes, infrastructure improvement charges, land cost, commercial zone, social imbalance and wars.

8) Good transportation facility increases density of population, commercial hub, land cost, entire connectivity of area, rate of industry, economy of city.

9) Availability of enough urban needs increases population density, sex ratio, increase or decrease literacy rate, skill and unskilled employment, various taxes like infrastructure improvement charges.

The present research work is to study the causes and consequences of changing Urbanization Patterns in the study region. This broad objective can be broken into the following main components.

1. To study the concept of urbanization.

2. To trace the Geographical and Historical Background of the study area.

3. To understand the transportation facility and its effect on urbanization in the selected study area.

4. To delimitation the Central Business District (C.B.D) with different urban key factors in the study area.

5. To study the division wise distribution of Population and Occupational structure and its effects on urbanization in the selected study area.

For the present study, division wise primary data collected through Horticulture office Nashik, District gazetteers, Nashik Municipal Corporation gazetteers, socio economic abstracts of the districts, agricultural statistical information of agriculture department of Nashik, some published reports, records maintained by Zilha Parishads, collector office, district land record office, Nashik Municipal Corporation Office, Irrigation Department, registrar and valuation department, various Government offices and Institutions, with the help of fieldwork. Apart from the field work empirical method also has been used.

The collected data processed and represented through different statistical and cartographic techniques. This study is based on secondary data handbooks, as well as from Nashik district census and other details, it has been collected from topographical map of Nashik district and top sheet no. in Nashik Municipal Corporation area are 46(H/16), 46(E/12), 47(E/9), 47(E/13). The analysis and interpretation of data has been done from the geographical point of view.

Analysis and interpretation of the collected data has been done division wise and delimited the CBD of Nashik city on the basis of assessed land values of various 103 market areas or paths of 6 divisions by taken into consideration and then maps has been drowned.

The collected data has been analyzed and interpreted division wise to find Density, Literacy, Sex Ratio, Occupational Structure of that division and related maps has been drowned. To find population growth and related things, various methods like Geometrical, Projection, and Increment Method was used.

Present Research Work is organized into 5 chapters.

The first chapter deals with the appraisal of the problem, Concept and Definition, Aim, Objective that has been employed in the present work.

The second chapter narrates with the appraisal of the problem, Review of the relevant Literature which has been employed in the present work.

The third chapter described Data Collection and Methodology which has been employed in the present work.

The fourth chapter deals with the Geographical Setting and Historical Background of Nashik City which includes location, Extend, Physiography, Climate, Soil Pattern, Drainage, and Land Use Pattern. Urban Transportation System in which the Growth of transport vehicle, Growth of Buses, Auto-Rickshaws and Division wise distribution of their stops, Frequency of Rickshaws and Buses, The

Structural Analysis of Transportation Network, The connectivity and Accessibility. For delimitation of C.B.D. of Nashik City the Assess Land value, Market Land value, Rent values has been studied. The C.B.D. of Nashik city has been delimitation on the basic new criteria/ in dieses, Wiz S.T.D. Booth, Local Telephone and Local Telephone Center, Coin Box and Coin Boxes Center, Internet Cafe and Xerox Center, Banks and Insurance Offices, Bus and Rickshaws Stops. Population and Occupational Structure of the study region from last two decades, consist of Silent Feature of Growth and Development, Population Growth in Nashik City, Population Projection and Incremental, Density of Population, Division wise Growth of Population, Division wise Density of Population, Population Distribution, Literacy Structure, Division wise Literacy Structure, Sex Ratio, Occupational Structure of Nashik City, Measures of Population Changes and Population Projection.

The 5th chapter describes Summary, conclusion and suggestion of the all studied chapters.

The city of Nashik is situated in the northwest of Maharashtra; on Latitude coordinate 19° 58' 59" North to 20° 04' 30" North Latitude and Longitude coordinate 73° 41' 30" East to 73° 52' 0" East longitude. The contour line of the city below 2000ft and the basin is at 1960ft. M.S.L.

In year 1881 Nashik has occupied 13 sq.km area. Then after in year 1931, it occupied 20 sq.km area, in year 1951, 47 sq.km area was expanded in Nashik city. Nashik Municipal Corporation was formed on November 7, 1982 as a body corporate under the Bombay Provisional Municipal Corporation (BPMC) Act, 1949. NMC serves area approximately 259sq.km, including the city and its peripheral 25 villages. It is one of the oldest cities in India.

The land use pattern of Nashik city has been divided into two areas i.e. developed area and undeveloped area. The undeveloped area contains 32.74 per cent and developed area contains 67.26 per cent of total area. The Nashik city is growing faster. Every day a new industry is established or devloped in the city due to establishment of Railway Station in the year 1861, industrial estates in the year 1962, India security Press in the year 1924, Currency note Press during year 1928. The phenomenal growth during the decade 1941-51 could be mainly attributed to the Government policy of rehabilitation of refuges.

Well established or developed Transportation structure also a cause to lead urbanization in Nashik city. This developed transportation structure has consequence on public as they have used individual transportation facility. Only the visitor has used private or government transportation amenities like rickshaw and bus. It is observed that, the highest frequency of Buses 155 per day was found from Nimani bus stand to Nashik Road bus stand and vice-versa because this area is located near Railway station so most of the people travel for their business relation to main area of the city.

According to division wise transportation analysis, most accessible node in Panchavati Division is Nimani bus stop, in New Nashik Division is Pathardi Phata, in Nashik West Division is College Road, in Satpur Division is Satpur, in Nashik road Division is Bytco *Chowk*, in Nashik East Division is Dwarka and for All Combine Divisions in the study region Dwarka is most accessible Node.

The transportation system analysis within study division of study area shows better degree of connectivity. This is also a considerable cause to lead urbanization. But at the same time this has consequence like increase population and population density, increase land cost, setup of commercial hub. This phenomenon of cause and consequence of urbanization have been seen in study area after analysis of transportation system analysis.

Assessed land values, Market values and Rent values decrease from central part to outward part of the Study region and this effect observed due to only the influence of C.B.D. Due to C.B.D. the Land, Market and Rent values within the C.B.D. got increased. Here, an attempt has been made to delimitate the CBD of Nashik city by taking few indices, which are completely different from other investigators, so this is a new approach to study the delimitation of CBD. In the Study region, the division-wise analysis has been done to find out concentrations of S.T.D. Booth, Coin-boxes, Fax Centers, Mobile shops, Computer Training Center, Internet cafe, Xerox Center, Bus stop, Rickshaws stop, Banks and Insurance Offices, Health and Education amenities.

In the study area total 629 Number of Hospitals has been observed out of which highest is observed in Panchavati Division and Lowest is observed in Nashik East Division. In the study area 4523 total number of Dispensaries has been observed out of which highest is observed in New Nashik Division and Lowest is observed in Nashik West Division. In the study area, total 5506 number of Doctors has been

observed out of which highest numbers is observed in Panchavati Division and Lowest is observed in Nashik West Division.

According to total Population of study area i.e. 14, 86,053 there are total 5506 numbers of Doctors. The ratio has been observed one doctor after 270 people, which is very good as compared to ratio within India i.e. 1 doctor per 1681 person and as per WHO 1 doctor per 1000 person.

In the study area total 351 number of Primary Schools and 2, 95,916 Students has been observed out of which highest Primary Schools has been observed in New Nashik Division and Lowest in Nashik East and Satpur Division. In the study area total 254 number of High Schools and 1,78,901 number of Students has been observed out of which highest number of High Schools has been observed in Nashik West Division and Lowest in Satpur Division. In the study area total 16 number of Engineering Colleges has been observed out of which highest number of Engineering Colleges has been observed in Nashik West and Panchavati Division. In the study area, total 18 number of Medical Colleges has been observed out of which highest number of Medical Colleges has been observed in Panchavati Division and Lowest in Nashik Road Division. According to Division wise total Education Faculties to the total Education Faculties in the study region Nashik West and New Nashik Division has highest percentage of total Education Faculties i.e. 19.72% and 19.10% respectively and lowest percentage has been observed in Nashik East and Satpur Division i.e. 12.20%.

Various social amenities like Hospital, Education, and Garden etc. also cause for urbanization. Generally the people attract towards these things and set up lives over there. Now medical and education amenities are well developed in study area. Improvement or development in medical and education amenities consequences like improve population, availability of bulk workers within study area, generate employment within these sectors.

The Nashik road railway station area in the Nashik road division and College road in the Nashik west division is the CBD of the Nashik city. In this division District Court, Collector office, N.M.C office, Most Educational Institute are situated due to which concentration of people to do related business has been observed and so it has become C.B.D. of study region.

Nashik was seventh largest city in year 1947 within Maharashtra and it is the 4th largest Industrial city. Nashik has achieved this, starting from year 1945 to year

2000. It is observed that the population of Nashik city has been continuously increasing from 1901 to 2011. In 2011 Nashik has become a million plus city. The growth of the population of Nashik city is considered from the decade 1901 to 2011. It has increased from 21,490 persons in 1901 to 14, 86,053 persons in 2011, i.e. more than fifty fold increase.

The density of population has increased from 1951 to 2011. In 1951 the density was 1,665 persons per sq.km and in the year 2011 it has been increased up to 5,736 persons per sq.km. According to 2011 census the Nashik city has 52.66 per cent males and 47.34 per cent females. A high level of literacy reflects the dynamic character of city population. According to 2011 census, the Nashik West Division has highest literacy rate i.e 82.30 per cent while lowest literacy rate has noted in Nashik Road Division i.e. 70.80 per cent. It is also observed that Nashik West Division has found highest female literacy ratio. However the general increase in literacy ratio especially female literacy in last three decades because fare atmosphere for woman learning and increased educational amenities in the city.

Occupational structure of the Nashik city for the decade 2001-2011 is observed with total number of workers in all categories including marginal workers are 7, 13,305 i.e. 48.00 per cent of total population 14, 86,053, out of which 4,74,811 persons are males and 2,38,494 are females. In male and female workers participation it is observed that women participation is very less but it is increasing gradually. The labour participation ratio works out 48.00 per cent as per 2011 census which is considerable good and this indicates the urban character of the study area.

In the year 2011 population was recorded 14,86,053 with 37.95 per cent decadal growth rate where absolute increase in this decadal growth observed to 17,66,469 persons. In the study region the highest growth rate found in the decade 1991 because of the growth of urban areas which is expanding into various colonies and migration of people from rural areas to urban areas for the purpose of employment. It is due to causes like Nearness to Mumbai and Pune, very good climate in all season, Holy place and Pilgrimage center, Good infrastructure, Good communication through road and rail, Atmosphere of industrialization, Good education center, Good cultural activities, commissioner and District head quarters, Agricultural produce market.

Increase of population is said to be the cause of urbanization as well as consequence of urbanization. In all decades there is a gradual increasing of

population growth rate in Nashik city and Nashik district of urban population because migration from rural areas to urban areas.

Increased in population reflect consequence like increase in density of population. It affects directly to the service provider authority for provide urban amenities to the population. If service provider authorities have short fall of income to provide the services, they have increased taxes like house tax, water tax etc. These have also increases land cost and other related costs within the study area.

Good education amenities in study area cause to lead literacy structure within study area but this have also consequences on terms of economy, Female strength, and Technical development within study areas. However the general increase in literacy ratio especially female literacy in last three decades because provisions of educational amenities increased, fare atmosphere for woman learning in the study region. A number of Primary, Secondary and Higher education institutions some of them exclusively for women are established in city during the last three decades.

The sex ratio of the study area was 898 in the decade of 1971 and slightly increases up to 899 in the decade of 2011. The growth rate of sex-ratio was very low in study region because migration of male working population from rural to urban area.

A developed occupational structure is also the cause of urbanization. This is the most important social characteristics influence on man's life. Total working population increased day by day in study area is showing a good urban character of city. Especially female working population increased rapidly due to various industrial units have been established in the Nashik city. This developed occupation structure consequence in the form of economy and social infrastructure within the study area. The majority of the workers are seen in secondary and territory activities nearly about 78.41 percent of total working population. The labour partition ratio observed 48 per cent in which comparatively female working participation is less but increasing gradually. It is the good sign of urban character of the study area.

The finding to this research study verifies the objective of "Causes and Consequences of changing urbanization patterns in Nashik Municipal Corporation, Maharashtra".

I hoped that, analysis and findings of present study shall help to provide valuable information for further studies, planning and application. Making a plan is not important but implementation of that plan is very important hence to solve the

problem is depending on proper implementation of plans. There should be proper co-ordination between Municipal Corporation, town planner and various governmental departments for the successful implementation of different development plans of the city.

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CHAPTER - 1
INTRODUCTION

1.1 INTRODUCTION:-

1.1.1 URBANISATION – DEFINATION AND CONCEPT

Urbanisation means migration of people from rural to urban areas due to which demographic explosion takes place and effect of this observed in terms of poverty. Three main factors contribute for suitable urbanisation equally i.e. liberalization, globalization and privatization but these factors play negative role in India.

The new technology introduced in the market relating agriculture industry, unprofitable agriculture industry and unfavorable weather conditions these are the causes for migration of people from rural areas too urban areas. Due to advance technology human working resources in the farms is replaced with machines, quality of soil is decreasing day by day, Polluted environment results use of heavy pesticides also effect farming. This has resulted that farmers are live in nearby urban areas for his survival.

Indus valley urbanisation is first phase of urbanisation in India. The long awaited second phase evolved after thousand years. Two types of culture strain observed In India, in North India the Aryan and in south Asia Dravidians are these two stains. This stream begins near about 600 B.C. and setup as permanent landscape features of India.

In India the progress rate of urbanisation was slow for a long period because dynasties and king larges. After that the revolution starts due to modern industrialization.

Urbanisation held in three different steps with three dimensional and pyramid structure. The base of this pyramid is rural urbanisation, at middle it is urban and at the top there is metropolitan. These all steps of pyramid are jointly together by commercialization. But in India apex is heavy while base of pyramid is substandard. These joints are very weak in India. To define urbanisation, it is necessary to learn its process and trends in developed countries and developing countries.

It has been observed that, index of urbanisation from rural to industrial growth is slow in India. It was 1827 nos. in 1901 and 5161 nos. in 2001, over the period of 100 years. This concentration is mainly observed more in class – 1 town during this

period. Within the countries this concentration observed small or medium either fluctuated or declared.

Though entire city is under Urbanisation, some part of the city is still undeveloped. It is also important to develop urban features in suburban areas for equal urbanisation like industrial, commercial and residential areas with proper connectivity of transportation network.

Urbanisation has played important role in the developed and the developing countries. Due to urbanisation, the developed city achieves fast economic growth. As growth of urban area increases it tends to increase urbanisation.

The man is a considerable factor who made large scale changes on earth's surface. This phenomenon change the urban character of the city (Johnson, 1972)

1.1.2 GEOGRAPHICAL SETTING AND HISTROLOGICAL EVOLUTION - CONCEPT

According to various aspects, human geography relates to urban geography. The most important role of an urban geographer is to criticize, Identify, Location, Space and creative patterns process in urban areas. For this task they must visit the sites to understand actual growth and its valuation. He must have to classify boundaries of town, cities, and villages. He knows the actual relationship between town and villages. He must know various aspects like Social, Economic and Political within urban areas where he wants to study. So geographer has task to define city or urban area actually but in a general practice most of geographers define the city in a similar way where life is based on job type, life style, cultural preference and political views.

The previous study for urbanisation goes on another way but in recent study United States considering location and actual position of urbanisation. In this study they mainly focused on impact of urbanisation on nature. Carl Sauer in 1920 done his study sees with different Goggle and motivated to the researcher for study the city and population with economic strength of that cities location (Raghavan, 2014).

1.1.3 URBAN TRANSPORTATION SYSTEM – CONCEPT

The word "Transport" stands for Trans + porter where Trans means across and Porter means carry. This transport occurs through Road, Water and Air. The transportation system is based on these all mechanical means and infrastructure created by various organized or its existing users.

Growth of Transport facility within that city or country plays an important role to sustained economic growth of any country or city. There are several modes of transport i.e. by i) Road, ii) Rail, iii) Water, iv) Postal shipping, v) Airways.

So it is essential for any government to look seriously that where the developed Transport system in city is with proper planning to achieve urban character at that city or country.

The word Traffic stands for people and vehicle, the word Transport stands for carry the people and goods from one place to another. Transportation word stands for to caring both Traffic and Transport. It involved all related activities for traffic and Transport (Rao, Pratap, 2001)

Day by day in the developing country like India more industrialization and Urbanisation takes places. So needs a sustainable transport network to achieve the economic growth as well as covers density of population. So in other words Transportation system is said to be a life line of urban development.

If you compare total World Road Network, India has one of the largest road networks. In India nearly 3.50 million kilometers road has been constructed. These roads connect many cities and villages. The developed road network in any city may give opportunity for door to door service even though topography of that city is uneven. It's also helping to the farmer and Industry to transport their goods from place of production to end-users. So the Transport system's role cannot deny by any manner. (Majit Husain, 2009).

Nashik city is the Headquarter of Nashik Administrative division which comprises of five districts. Nashik is situated 185 kms from Mumbai and 200 kms From Pune. So it is the part of golden triangle of Maharashtra viz. Mumbai-Pune-Nashik. The National highway No.3 i.e. Mumbai-Agra road connects Nashik to important cities like Mumbai and Dhule and national highway No.50 connects Nashik to Pune. Nashik also has good railway connectivity as it is situated on the main line of central railway i.e. Mumbai-Bhusawal section. In addition to this, Four state highways i.e. Nashik-Dindori-Wani (SH-11), Nashik Peth (SH-12), Nashik Aurangabad (SH-60), Nashik-Trimbak (SH-4) also provide additional connectivity. Among of these state highways connect Nashik to Gujrat state. One Major river i.e. Godavari flows through the city and its three tributaries i.e. Darana, Nasardi and Waldevi also flow through study area.

Nashik Municipal Corporation is spread over 259.10sq.km. Such a large area is broadly divided into six distinct divisions geographically. Each of the division has their arterial roads and their link roads with other division. Besides these roads, inner and outer ring roads, as per the sanctioned development plan of Nashik city (sanctioned in 1993) are being developed by Nashik Municipal Corporation thus existing road network of NMC is based on all these roads. (CDP of Nashik)

1.1.4 DELIMITATE OF C.B.D. – CONCEPT

C.B.D. is the term which also exclusively considered in urban developed countries. Actually it is not the separate part of the city but this is the part of the city where the relation of any business manner collectively combined. The word C.B.D. indicates the heart of that city like down town which one introduces firstly by America. C.B.D. is visualized due to its specific function and specific land used which is never seen in other part of the city. So it is also the nucleus of the city which focuses all urban character like education, health, transport, communication etc. (Carter, Harold, 1972). In the twentieth- century formation of C.B.D. is the example of construction technology and transport technology combined work together (Daniel peter and Hopkinson, Michael, 1985).

In the urban system C.B.D. is the most accessible part of the city which is Centre point of the transport network established within the city. It is accessible for not only residing people but also for commercial. It is not only connected by roads but also connected through rails and water for big metro Politian. So this is influence of C.B.D. on development within the entire area.

Due to massive infrastructure development, basically vertical tends to increase cost of land so automatically house rent is increased within the C.B.D. The land used with the C.B.D. may change time to time as per requirement or need for response of current economic condition. Eyes of C.B.D. always see future (Mandal, 2000)

1.1.5 POPULATION OCCUPATIONAL STRUCTURE - CONCEPT

The UNO describes its repeal that more than 50% population lives in urban areas in the world. This physical growth in urban areas leads to global change. Urbanisation is also called as migration of people from rural to urban areas equating to urban migration.

The per cent (%) of population increases in residing town due to migration of rural people into cities/towns. viz natural growth of cities by residing people from

child age tends to change patterns of migration. Due to migration of people from rural area, the employment structure of agriculture and other related industries get reduced and urban employment character got increased.

Due to these certain reason some of discussed as earlier leads population of city faster. But at that same time required infrastructure does not developed with same rate and people would face problem like water, traffic, sewage system, electricity etc.

As discussed earlier, regarding problem from rural area and its related industries, the migrants from rural area to city are mostly young. This youth population has increase birth rate faster. So this undesirable growth has disturbed environment cycle.

As the population of city increases, it results to change dimensional boundaries of the cities which cover the main city as well as its surrounding area. It indicates urban character of city (Pull Rao, 2012)

Basically in urban areas most of the people are engaged in non-agriculture activities as well as non-agriculture land used for specific purposes.

It has included.

i) Urban population densities always higher than agricultural population.

ii) Population migrates from rural to urban area.

iii) Source of occupation shift to non-agriculture activity from agriculture.

iv) Land used pattern changed from agriculture to non-agriculture.

As stated earlier United Nation Organization describes that more than 50% population live in urban areas. This phenomenon is observed due to massive improvement in science and technical fields. Man can fly behind its limits and so industrial and agricultural development occurs rapidly. This tends to increase density of population and so natural environment or ecosystem get disturb (Husain, 2002).

Increase in density of population over some entire area of the city tends to direct impact on resources within that area. So it is necessary to control this migration by political, economic, physical, for social cultural way.

Now a day's increase density of population in urban areas results lack of availability of affordable houses. If this issue is sorted out properly with the help of proper land use, planning and proper connectivity with suburbs area, then it will be helpful to create massive employment within the cities.

Generally the tendency of people is that they are being attracted towards developed urban areas where all urban amenities are available. This phenomenon leads undesirable growth of population within that special area. This creates difficulties to planning authority for maintaining the quality life style of people. After saturation of these areas, people shift to peripheral areas of this developed portion. So again it is difficult to maintain or provide urban facility to these sunburns areas. This happens where the population of the city is more than 10 lacks.

As per the 2001 census, Maharashtra is the second largest populated state in India .Uttar Pradesh is at the first position. Maharashtra's population was 9.67 cores, which constituted 9.4 per cent of the total population (102.70 cores) of India. During the decade 1997-2001, there was an addition of 1.78 core people in the state. The urban population in the state of Maharashtra was 27.78% in 2001 and now it is 42.42%.

1.2   CHOICE OF THE TOPIC

There is a need to develop socioeconomic infrastructure for increasing urban population growth to control the unprecedented growth of urban population which is due to migration. The findings confirm that infrastructure has a significant role in determining the level of urbanisation in India.

The millions of cities in the third world started growing very rapidly after 1960s, A geographer's primary interest is in the study of the inter relationship between people and habitants. In an Urban setting, the habitat comprises not merely the territory of the city and its hinterland but also the spatial linkage between a large number of urban and rural settlements within the region.

The landscape of urban settlements in India provides a variable laboratory for the study of the complex inter-relationships among the people, physical and cultural environments in which they live. The adverse effects of unprecedented growth of cities, particularly those with a population of over a ten lacs, are not only confined to the core, with a very high population density, but a spill over to their peripheries.

Nashik city is developed under historical and religious factors. This small religious center became an administrative headquarters in the British rule, its spatial growth with western type of development. Nashik also became an important educational center and a service center of the western part of Maharashtra. Major social, commercial and strategic institutes are developed all around the Nashik city.

Transportation system is well developed in Nashik city. The railway line is connected with an imperial road of the Nashik city.

As per above aspects Nashik city has been selected and studies in urban Geography. Besides these, researcher is belonged to the study region and knows the various functions and service activities in detail. The researcher also knows the problems of the study region.

1.3   THE PROBLEM

In many countries the urbanisation is happened in wrong manner and they did not follow disciplined concept of urbanisation. In many Indian cities only urbanisation increases but the urban amenities are not increasing accordingly, poor economic base is also seen in many cities.

1)   In Indian context, urbanisation has some basic problems like slums, Sewer, Transportation, pollutions like Water, Air and Land, deficiency of some basic amenities like School, Hospital, Colleges and Affordable housing etc.

2)   Due to lack of various technologies, the urban industry can't develop properly which results unemployment generation that showing further effect like spreading of poverty within the urban areas. This poverty introduces unskilled and illiterate labours which decay the urbanisation.

3)   Due to degenerating Economical and Social qualities within the urbanisation leads crimes and antisocial activity. The uncontrolled urbanisation also hampered environmental degradation like Air, Water, Sound and Land pollution. The unskilled and illiterate people who migrate from rural area to urban areas also form urban decay, Unproductiveness, In-efficiency.

As far as Nashik city concerned most of the people migrates from adjoining rural areas, leads short come of affordable house which tends to increase unauthorised slums. In urban areas the slums increased various Diseases, Poverty, Pollution, lack of civic sense and antisocial movements.

The transportation and traffic is very uneven in the city. The increasing number of scooters, motor, bikes and cars make the traffic problem worse. There exhaust smoke polluted the air. The use of electrical gadgets is increased in the cities and so the old industries has face problem in shortfall of electricity.

Drinking Water supply is the greatest problem of the city. Availability of Land is also a major problem. Continuous migration from rural increases and availability of land is decreases.

Municipal Sewer, waste water collection and disposal is also a major problem in the city. There are many health problems seen due to water in cities. It causes cholera, typhoid, hepatitis, diarrhea and other infections. The polluted water is causing skin infections to children and adults.

As Nashik city is a fast growing city in India with growth of various aspect like Industry, Housing, Commercial zone which results growth in population rapidly. This growing population affects available urban amenities like Health, Education and Playgrounds etc directly. Now city is facing a serious problem of affordable housing, adequate water supply so it is necessary to resolve the problems immediately.

The Municipal Corporation and government of Maharashtra are trying to solve these problems by constructing new houses with the help of several organizations like MHADA, PMAY etc.

The Nashik city, being an important industrial center of north Maharashtra, has developed rapidly but unplanned hazardous growth of the city has created many problems. One of the major problems is the connectivity of the various areas. The number of city buses is limited, bus routes are not well-planned, roads are narrow, and frequency of buses on few roads causes inconvenience to the people of the city. Traffic congestion in the peak hours at center of city is also a major concern.

As the population increased rapidly, the transportation from government sector is inadequate and so people believed on their own vehicle for transport. Due to this, the roads within the city have shortfall to manage such traffic. So it is necessary to develop proper transportation system within the city from the government to avoid uses of private vehicle.

As industrial areas increase, it also increases water and Air pollution. So it is necessary to bann direct throw of smoke through chimneys in the air and disposal of polluted water in drinking water sources. Polluted water must be collected properly by spreading a sewer lines up to the sewage treatment plant (STP). In the slum areas various schemes like Rajiv Gandhi Awas Yojana, Valmiki Awas Yojana, House for dis housed, scheme under JNNURM, Ramabai Ambedker Awas Yojana, should be implemented in the city for proper urban planning of the slum area. This will be helpful for slum habitant to improve their lifestyle and Healthy atmosphere.

As far as Nashik city is concerned, it has limited problems which may be resolved in due course of time. So life in the city is the pleasant and livable.

1.4   CAUSES AND CONSEQUENCES OF URBANISATION

1.4.1   CAUSES OF URBANISATION

There are many causes which lead to urbanisation but all causes can't be explained. So some important causes are explained as follows.

1)   Historical background of the city leads to set up urbanisation within the city.

2)   Healthy atmosphere, Good weather condition lead urbanisation of the city.

3)   Due to unpredictable weather and unpredictability of production of crops and use of new technology in agriculture industry, many people from agricultural sector migrate to the cities for employment opportunities in various sectors.

4)   Establishment of large scale of industries tends to migration people from rural areas to cities for employment opportunities.

5)   Establishment of Central Business District (C.B.D.) is also a cause of urbanisation.

6)   Availability of Various social amenities like school, Hospital, Gardens, and Roads etc. also attracts people towards cities to improve their life style.

7)   Some part of the city, which offers high standard life style, also attracts people to improve their life style.

8)   Good transportation network also lead urbanisation of city.

9)   Enough availability of urban needs within the city also leads urbanisation.

1.4.2   CONSEQUENCES OF URBANISATION

Causes of urbanisation, as discussed above have results some consequences mentioned as follows.

1)   Due to historical background urbanisation increases but it also leads to increased population density, decreased literacy rate, increased sex ratio, and increased tourism.

2)   Healthy atmosphere and good weather condition leads population density, decreased sex ratio, limited provision needed for service provider authority, reduces water demand and electricity demand.

3)   Migration of people from agriculture sector to urban sector leads unemployment in agriculture sector, Lack of youth employment in agriculture sector, lowers the income of depending family as well as economy in rural areas.

4)   Industry leads to urbanization but it also increases population, Sex ratio, density of population.

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5) Central Business District increases various things likes land cost, market cost, Rent value, establishment of different types of commercial hub, stress on service provider authority, rates of urban needs, population density, banking amenities, education amenities and health amenities.

6) Educational and Hospital amenities lead to generate employment of that sector and related business.

7) A high-end life style increases various taxes, infrastructure improvement charges, land cost, commercial zone, social imbalance and wars.

8) Good transportation facility increases density of population, commercial hub, land cost, entire connectivity of area, rate of industry, economy of city.

9) Availability of enough urban needs increases population density, sex ratio, increase or decrease literacy rate, skill and unskilled employment, various taxes like infrastructure improvement charges.

1.5 AIMS AND OBJECTIVES

The present research work is to study the causes and consequences of changing Urbanization Patterns in the study region. This broad objective can be broken into the following main components.

1. To study the Urbanization Concept.

2. To trace the Geographical and Historical Background.

3. To understand the Transportation Facility and its effect on urbanization.

4. To delimit the Central Business District (C.B.D) with different urban key factor.

5. To study the division wise distribution of Population, sector wise Occupational structure and its effects on urbanization.

1.6 DESIGN OF RESEARCH WORK

Present Research Work is organized into 5chapters.

The 1st chapter deals with the Concept and Definition, appraisal of the problem, Aims and Objectives, that have been employed in the present work.

The 2nd chapter is deals to the Review of the relevant Literature that has been employed in the present work.

The 3rd chapter describes source of the Data Collection and Methodology that have been employed in the present work.

The 4th chapter deals with the Geographical Setting and Historical Background of Nashik City including location, Physiography, Climate, Soil Pattern,

Drainage, Land Use Pattern. It also deals with the Urban Transportation System in which the Growth of transport vehicle, Growth of Buses, Auto-Rickshaws and Division wise distribution of their stops, Frequency of Rickshaws and Buses, The Structural Analysis of Transportation Network, The connectivity and Accessibility is discussed. For delimitation of C.B.D. of Nashik City the Assess Land value, Market Land value, Rent values have been studied. The C.B.D. of Nashik city has been delimitate on the basic of new criteria/ in dieses, Wiz S.T.D. Booth, Local Telephone, Local Telephone Centre, Coin Boxes, Coin Boxes Centre, Internet Cafe and Xerox Centre, Banks and Insurance Offices, Bus and Rickshaws Stops. Population in last few decades of the study region is also studied. Analysis consist Salient Features of Growth and Development and Population Growth in the Nashik City. Population Projection and Incremental, Density of Population, Division wise Growth of Population, Division wise Density of Population, Population Distribution, Literacy Structure, Division wise Literacy Structure, Sex Ratio, Occupational Structure of Nashik City, Measures of Population Changes, Population Projection, have been studied in this chapter.

The 5th chapter describes Summary, Conclusion and Suggestion of the various studied elements in above chapters.

CHAPTER - II
REVIEW OF LITERATURE

CHAPTER – II
REVIEW OF LITERATURE

In India Indus valley introduced brief study of urbanization in 2350 B.C. In this study some parts of Rajasthan, Punjab and western Uttar Pradesh are also included. Due to the absence of data for such urbanisation, many researchers date varied like (wheeler, 1947). Quote 2500-1500 B.C. while (Agrawal, 1964). Quote 2300 and 1720 B.C. on the basis of radio carbon.

When agriculture land is converted into non-agriculture land for use of residential purpose, it is known as urbanisation. Due to this process, population increases in that area (Husain, 2002).

It is a difficult task to maintain the statistical as well as dimensional structure of all data of Urbanization growth. So quality of life for an environment is always equal to urbanization (Prakashrao, 1983)

The research work under various titles such as urbanization of the city, Origin and evolution, planning Areas of the city is land of towns has been done by government agencies as well as at individual levels for Nashik Municipal Corporation. The problems of urban centers in India have emerged as one of the most challenging issues in India. Most of early urban geographers have studies in respect of their evolution, causes and consequences of changing urbanization patters, factors influencing urbanization, land use, transportation system and demographic characteristics

The study of urbanization and city growth having confusion to define its fundamental but it can be measured by urban areas itself. In other words, it is said that growth of any city defines its urbanization. There is no defining another for what the urban area but now a days world become more urban in nature so its changes in time tell us it's urban character (Frey, Zimmer, 2001).

Day by day urbanization in the world increases itself. In current scenario fifty per cent of total population lives in urban area. At the beginning of 20th century, there were only 20 cities having population in millions but today 400 cities in the world have their population in millions. It happened due to the change over rural life style to urban life style in nature. Working population decreased in agriculture activity and increased in non-agriculture activity (Barney, 2004).

R.L. Singh published his work on Banaras urban geography in the year 1955 and then many researchers follow him in research of urban geography (Singh, 1955). Many of geographers wrote an urban geography related their town and cities for the study of urbanization.

De N. K. and, Bose A.K in 1989 has studied' urbanization and environmental problems (De. N.K and Bose, 1989), Mulik A.D. in 1989 has highlighted urbanization of south Maharashtra plateau (Mulik, 1989). Satara city in urban geography has studied by Patil R.A. (Patil, 1996). Zodage S.B. in 2001 has studied the impact of urban growth on environment of Kolhapur city (Zodage, 2001), Kumbhar A.A. in 2006 has studied on urban Satara city (Kumbhar, 2006).

Urban study of Jalgaon city has studied by Khadke P.A (Khadke, 2007). Kale B. J. has studied population growth of Satara district, Kamble D.C in 2009 has studied Town development in Maharashtra (Kamble, 2009). Nyambod E.M in 2010 has studied environmental consequences of rapid urbanization of Bamenda city, Cameroon. (Nyambod, 2010)

Dunfa K.D has studied impact of urbanization and industrialization on the Andhra city (Dunfa K.D.). Wadekar S.K and Aher M. has studied urban local government: A study of revenue and Expenditure of Municipal Corporation in Nashik district. (Wadekar and Aher), Dutta A.K (1969) has studied 'Urbanization in India' Research paper published in Kolkata (Dutta A.K. 1969).

After reviewing the above mentioned studies in various parts of urbanization, it is found that most of the work has been done on the pattern of urbanization. The Nashik city has been selected as the study area for understanding the influencing factors of urbanization, causes and consequences of developed urbanization in Nashik city.

Sita, K. in his studies on south Konkan in the year of 1972-73 said that urbanization in south konkan would be lead if it is push by an industry (Sita, 1972-73). K.M. Kulkarni in 1981 studied urbanization of Nashik city, in his study he said that Nashik is an Indian city which has both ancient and modern structure (Kulkarni, 1981). S.S. Kothavale in 1987 has studied town's urban study of Maharashtra (Kothavale, 1987).

Development of country or region is directly proportional to the transport and communication facility within that region or the city. The transportation network

provides instrument for the life of the people within that region or country (Robinson and Bomford, 1978).

Urban transportation system is the mode of transferring goods or people above or below the ground within city or region by means of street, water and air, with the help of instrument like automobile, railway and aero plane (Encyclopedia Britannica, 1977).

Day by day transportation plays an important role for development of urban areas. It is the pool between morphology and hydrology of that city (Dickinson, 1956).

Transportation system helps any city or country for its economic developments. It plays an important role of circulating goods and people from one place to another. It acts as arteries of the city organism which provides connectivity for inner part of the city to outer part of the city (Singh, 1964). Transportation system is also said as arteries or veins which supply breath to the city (Smailes, 1963).

In India various studies have been carried out by geographers at the regional level as well as local level. Agrawal B.L. 1967 has studied the patterns of rail traffic flow of Madhya Pradesh (Agrawal, 1967). Sinha, B.N 1970 has studied the traffic pattern, road movement and traffic problems of Sirsi town (Sinha,1970). Raza M., Agrawal, Y. 1986 has studied the Transport Geography of India (Raza and Agrawal, 1986).

Agarkar, Rajguru in 1989 has studied transportation system of Ratnagiri district in which he explained economical evaluation by Rail, Road and Water transport. Transportation is also a basic facility which accelerates the economy of that city. Now a day's transportation becomes life of that city. This plays an important role to lead for tourism, regional planning and integral development (Agarkar, Rajguru, 1989). Shukala, bhaduri also studied role of transport and city spread of Calcutta urban agglomeration (Shukala, bhaduri, 2003).

Many researchers have studied transportation system with economy of that city. Gautam P.S. in 1992 has studied Chambal division of Madhya Pradesh for impact of transport network on economy of that region (Gautam, 1992). Kulkarni K.M. in 1997 of his study has presented the relation between economy and transportation system of Nashik city (Kulkarni, 1997). Date V.S. in 1999 has represents the changing pattern of transportation system and its problems of Pune city (Date, 1999). R.C. Tiwari has also studied geography of India (Tiwari, 2006).

As reviewed authors mentioned above, it is found that most of the work has been done in the field of urban transportation and regional transport system in which they have analyzed the transport network of the study region. As reviewed above literature, every geographer has studied transportation network within study region and its effect on economic growth of that region. They used various analytical methods and represents on graphs. In the present study, an attempt has been made to study the urban transport system of Nashik city, with the help of various quantitative methods.

The growth rate of urbanisation is increasing poverty in the city and unemployment of the rural area. As compare to rural area employment within urban area have increased due to industrialization. Urban area provides better life style like education and health facility. Urbanisation provides modern life with physical development of city in terms of civilization (Pull Rao, 2012).

Now it is essential to study C.B.D. in Indian towns or cities with their functions and features. The development plan of urban cities is taken into consideration for determination of C.B.D. and its other parts. As far as Indian cities are concerned, there is no problem to determine C.B.D. of urban town. The people are always gathered together for business where it has supported by some part of any city within India. There is *chowk bazar* which leads related business expansion. In India most of cities spread up fast in any direction to its original location but in India C.B.D. always expanding in their neighborhood area. After the studies of urban areas central business district is always located at the center of city.

Now urban planner or geographer focused his study to determine the C.B.D. of study area. They approach to determine the C.B.D. in three ways which has defined as follows.

1) By identifying boundaries and introducing their views to determine limit of the C.B.D. Also take many sub-units in consideration for delimitation the C.B.D.

2) The second step works on to determine the planning element which shows existence of C.B.D. or independently seeking same feature which shows character of C.B.D.

3) The third step works for independent requirement for there arts, entertainment and linkages.

These three steps don't explain clarity so there is need to introduce other important elements but as far as they are written in order they may be lead to grownup. Deep intense and micro eyes level doing traditional use of land to take decision as far as it's grown to be taken in consideration while constructing C.B.D. (Carter, Harold, 1979).

Proudfoot M.J in his study considered annual turnover of trade (Proudfoot, 1937) while Harihar, Singh, in his study of Kanpur city considered main function of C.B.D. by which it run and the land values within it (Harihar, Singh, 1972). Ananthapadmanabhan used street frontage to delimit C.B.D. Williams C., considered shop rent to delimitation of C.B.D. in Worcester city (Williams, 2008). The C.B.D. of the Munger has studied by A. K. Dutta (Dutta, 1969). The C.B.D. of shillong city has been studied by Singh J.P. (Singh, 1966).

From the review of literature mentioned as above, it has found that most of the work done on the basis of various criteria to delimitate the C.B.D. In the present study, an attempt has been made to delimitate the C.B.D. of Nashik city on the basis of new criterion which has not been used by any other scholar. This new criterion such as S.T.D. booths, local phones, computer training center and number of computers, internet and fax centers, Xerox centers, number of bus and rickshaw stops with their numbers, various types of banks and insurance offices etc. has been considered division-wise and studied for the purpose of delimitation on C.B.D. of Nashik city.

Population influences on the size, structure, composition, growth and migration pattern of any city. Migration along with birth and death rate is an element to determine the population growth and structure of a country or region. A temporary and permanent change of resident either single or with family known as migration. Migration leads to population in all ways within regional, state or International. This may cause on redistribution of population and its effect on changing in urban resources. Migration is common thing for human to develop its social as well as economic growth (Husain, 2002.)

Nobody can define exact future growth of urban area. There are always considerable facts that affect the assumed growth of urban area. Calculated urban growth before 20 years ago has been not achieved as desired due to such effect of same criteria. So it is necessary to carefully define projected growth. The world is in urban changing pattern which changes the face of earth. It is not necessary to see

urbanization in terms of density of people but it goes to integrate the region and global. With a long time it has seen that there is no change in life style of urban and rural people. (Simmonds, Hack, 2000)

We have seen always difference between urban and rural areas with many reasons and development. This is one of the challenges for science to resolve this difference. There is a need to classify zone of difference. Urban area has growth in population and economy as the politician's policy concentrate on such region. So now it is needed to clarity urban policy analysis which affects urban development (scott, 2001).

As we have seen urbanization in large view, demographic is considered as a separate factor or variable to study the economy in urban area. The economy gives lead to progress in urban area. The demographic growth is sustainable growth which leads to change structure of urban area. This affects people to attract towards such area. This leads to economy of urban areas with large scale production (Husain, 2002)

CHAPTER-III
SOURCE OF DATA AND
METHODOLOGY

CHAPTER-III

SOURCE OF DATA AND METHODOLOGY

For the present study, division wise primary data is collected from Horticulture office, Nashik. Statistical abstracts, district gazetteers and Municipal Corporation Nashik gazetteers, socio economic abstracts of the districts, agricultural statistical information of agriculture department of Nashik, some published reports, records maintained by District council, Collector office, District land record office, Nashik Municipal Corporation Office, Irrigation Department, registrar and valuation department,various Government offices and Institutions, With the help of field work. Apart from the field work, empirical method also has been used. The following formulas have been used in present study

1) Percentage of zone $= \dfrac{\text{Area of zone}}{\text{Total Area}} \times 100$

2) Percentage of register category vehicle $= \dfrac{\text{No. of category vehicle}}{\text{Total No. of register vehicle}}$

3) Division wise frequency of rickshwas $= \dfrac{\text{Division wise No. of Trips}}{\text{Total No. of. Trips}}$

The research work is based on secondary sources of data. Other than secondary source of data Other details will be collected from topographical map of Nashik district, Nashik district census and Topo sheet of Nashik Municipal Corporation area having Nos. - 46(H/16), 46(E/12), 47(E/9), 47(E/13). The analysis and interpretation of data has been done from the geographical point of view. The collected data will be processed to analyzed structure of road network for various divisions by using the following formulas,

1) Cyclomatic number $= e - v + p$

2) Alpha Index $= (e - v + p /2v - 5) \times 100$

3) Beta Index $= e / v$

4) Gamma Index $= (e/3 (v-2)) \times 100$

5) pi (n) index $= \dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$

6) ETA index (n) $= \dfrac{\text{Total network distance (km)}}{\text{Number of Edges (Arcs)}}$

$$7) \text{ Detour Index} = \frac{\text{Actual route distance}}{\text{Straight line distance}} \times 100$$

On the basis of these assessed land values of various 103 market areas or paths out of 6 divisions have been taken into consideration and then the collected data has been analyzed and interpreted ,division wise map are drawn to delimitate the CBD of Nashik city. The following formulas have been used in present study

$$1) \text{ Division wise percentage of indices} = \frac{\text{Division wise indices}}{\text{Total indices}} \times 100$$

$$2) \text{ Division wise percentage of Amenities} = \frac{\text{Division wise Amenities}}{\text{Total Amenities}} \times 100$$

$$3) \text{ Doctor Patient Ratio} = \frac{\text{Total Population}}{\text{Total No. of. Doctor}}$$

The collected data has been analyzed and interpreted division wise to find Density, Literacy, Sex Ratio, Occupational Structure of that division and related maps are drawn. To find population growth and related things, various methods have been used like Geometrical, Projection, and Increment Method etc. The following formulas have been used in present study.

$$1) \text{ Growth in Percentage} = \frac{\text{Current decade Pop}^n - \text{Previous decade Pop}^n}{\text{Previous decade Pop}^n} \times 100$$

$$2) \text{ Population Growth rate} = \frac{(P_2 - P_1)/t}{(P_2 - P_1)/2} \times 100$$

$$3) \text{ Density of Population} = \frac{\text{Total Pop}^n \text{ of current year}}{\text{Area of current year}}$$

4) Decade wise Growth rate =

$$\frac{\text{Current Decade div. wise Pop}^n - \text{Previous decade div. wise Pop}^n}{\text{Previous decade div. wise Pop}^n} \times 100$$

5) Division wise Density of Pop^n $\qquad = \qquad \dfrac{\text{Div. wise Total Pop}^n \text{ of current year}}{\text{Div. wise Area of current year}}$

6) Division wise percentage of male Pop^n = $\dfrac{\text{Div. wise male pop}^n \text{ (n year)}}{\text{Total male pop}^n \text{ (n year)}}$ X 100
  (n year)

7) Percentage of literacy pop^n $\qquad = \qquad \dfrac{\text{Literacy population (n year)}}{\text{Total population (n year)}}$
  (n year)

8) Percentage of div. wise literacy pop^n = $\dfrac{\text{Div. wise literacy pop}^n \text{ (n year)}}{\text{Div. wise total pop}^n \text{ (n year)}}$
  (n year)

9) Sex ratio $\qquad = \qquad \dfrac{\text{Total female pop}^n}{\text{Total male pop}^n}$ X 1000

10) Div. wise Sex ratio $\qquad = \qquad \dfrac{\text{Div. wise Total female pop}^n}{\text{Div. wise Total male pop}^n}$ X 1000

11) Percentage of total workers $\qquad = \qquad \dfrac{\text{No. of. Sector wise workers}}{\text{Total workers}}$ X 100

12) Population projection by Arithmetical Increase Method:-
$$P_n = P_0 + P_2 + N$$

13) Population projection by Incremental Increase Method:-
$$P_n = P_o + P_2 + (N \text{ X ID})$$

14) Population projection by Geometrical Increase Method:-

$$P_t = P_0 (1 + K)^N$$

CHAPTER – IV

ANALYSIS AND INTERPETATION

CHAPTER – IV
ANALYSIS AND INTERPETATION

*	**GEOGRAPHICAL SETTING OF NASHIK CITY**
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4.2	**NASHIK CITY: BOUNDARIES**
4.3	**NASHIK CITY: GEOLOGY**
4.4	**NASHIK CITY: PHYSIOGRAPHY**
4.5	**NASHIK CITY: SOIL**
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4.20	**NASHIK CITY: FREQUENCY OF BUSES:-**
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CHAPTER – IV

ANALYSIS AND INTERPETATION

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*   GEOGRAPHICAL SETTING OF NASHIK CITY

A) GEOGRAPHICAL BACKGROUND

4.1   NASHIK CITY: LOCATION

Maharashtra state, with area of 3.08 lakh square kilometers and occupying 9.4 per cent of India's geographical area, is located in western India. It has seven Divisions – Amravati, Aurangabad, Kokan, Mumbai, Nagpur, Nashik, and Pune. The Nashik Division has five Districts – Nashik, Jalgaon, Nandurbar, Ahmednagar and Dhule. Nashik city is the headquarters of Nashik district and Nashik division. (CDP of NMC)

Nashik city is situated in the State of Maharashtra, Northwest region on Latitude coordinate 19° 58' 59" North to 20° 04' 30" North Latitude and Longitude coordinate 73° 41' 30" East to 73° 52' 0" East longitude (as shown in fig. 4.1). It is connected by road to Pune (220kms) and Mumbai (185kms). Rail connectivity is through the central railway, attached with Mumbai. Air connection is with Mumbai, and the air service is not consistent and proper Airport does not exist. In this geographical location, the city naturally started growing westward between the two main rivers, the Godavari and the Nasardi, towards Anandvalli, Gangapur and Satpur area.

Nashik City - Location
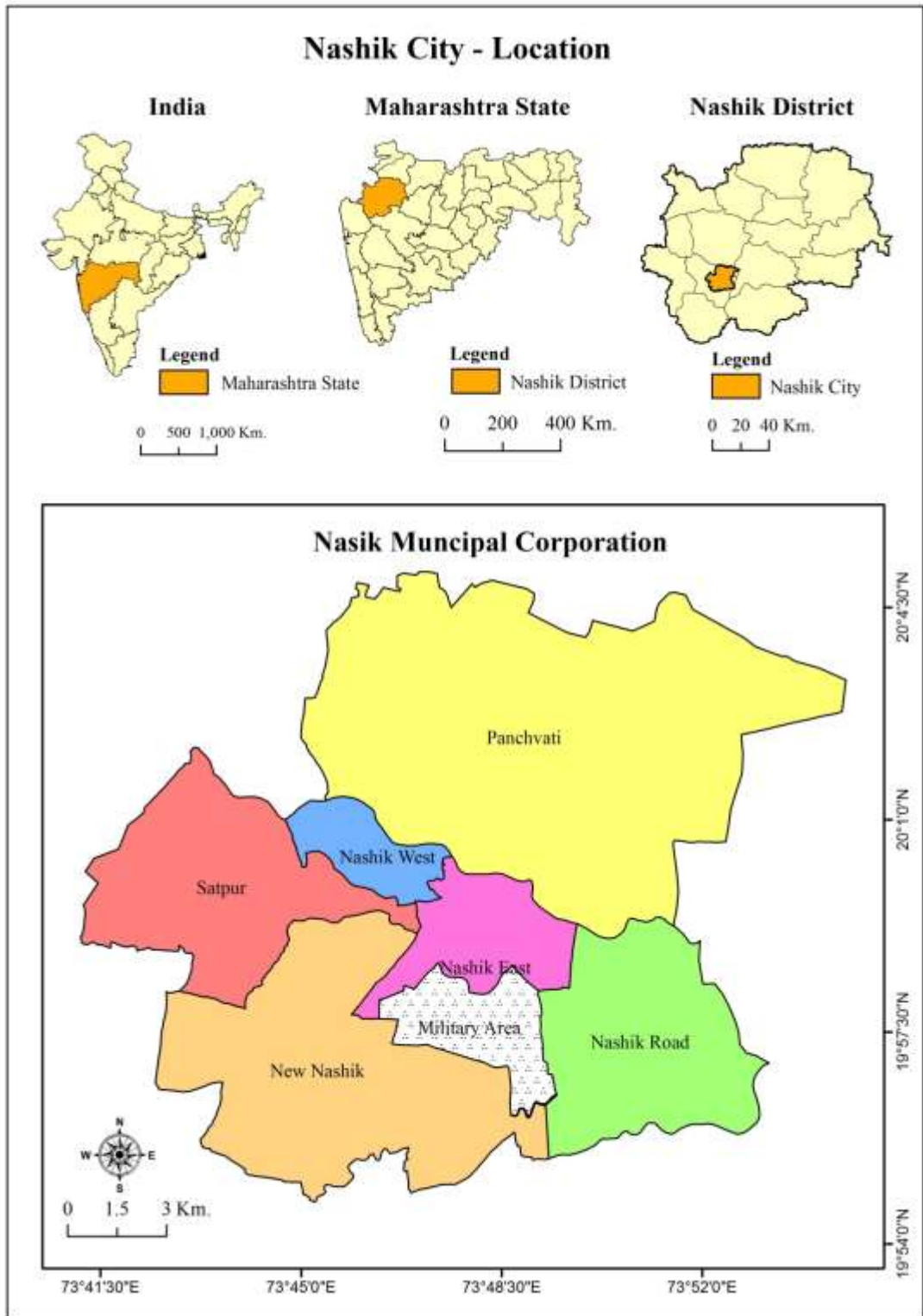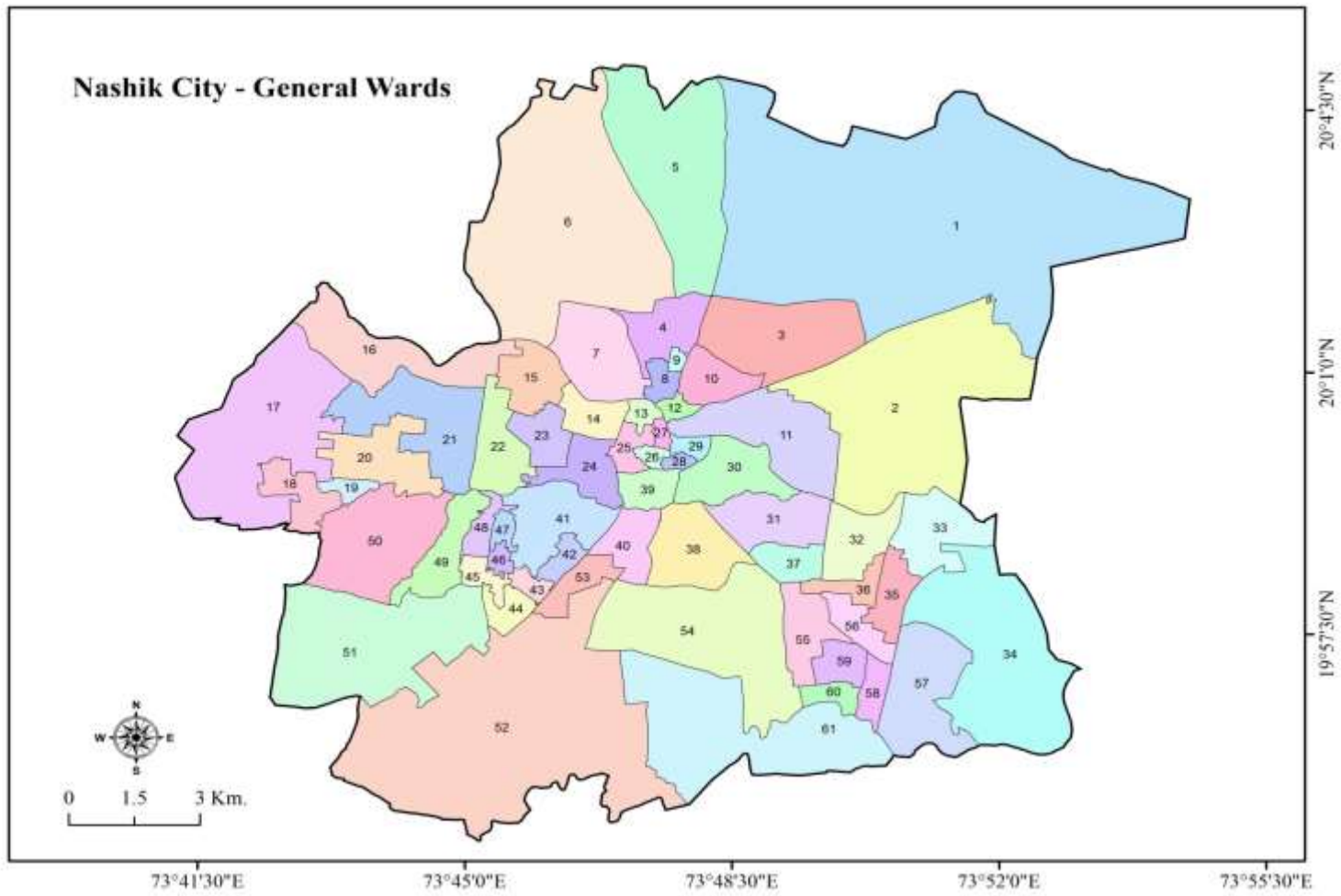
Fig. 4.1

Fig. 4.1(I)

4.2   NASHIK CITY : BOUNDARIES

The growth in population necessitated the expansion of city boundary. its help provides and extend urban services to the people occupying the peripheral villages and makes more land available for urban population.

In 1881 old Nashik was occupying 13 sq.km area. Then in 1931 it was expanded up to 20 sq. km and population increased rapidly day by day. In 1951 it was expanded up to 47 sq. km area. In 1982-2001 population increased with high rate and area expanded up to 259.10 sq. km. When population increased in Nashik city, changes in boundary lines observed. The Nashik city is central place of Nashik district. 25 villages are included in Nashik city, the Northern boundary bounded by villages Makhamlabad, Mhasrul etc, East by the villages Manur, Panchak, Nandur Dasak, on South by the villages Pathardi, Dadhegaon, Pimpalgaon Khamb, on the West by the Gangapur, Pimpalgaon Bahula and Satpur (As shown in Fig. 4.2).

4.3   NASHIK CITY : GEOLOGY

The great trap of the Deccan covers the whole district. It is entirely of volcanic form action. The volcanic portion consists of compact stratified basalts and an earthy trap. The basalts is the most conspicuous geological feature. In some flows the basalts is columnar and then it weathers into the fantastic shapes. The formation at the base of the traps is chiefly amygdaloidal, containing quarry in vertical veins, crystals and zeolite mineral, especially apophyllite weathering into a grease soil.

The absence of laterite, which caps the summits of the south, is a curious feature in the area of geology. The basalt is not only fined textured but also course and nodular. (Maharashtra State Gazetteer, 1975)

4.4   NASHIK CITY : PHYSIOGRAPHY

The contour line of the city is below 2000ft and the basin is at 1960ft M.S.L. It is a transitional region from the upper reaches in the Sahyadris and the Plateau. There are some isolated hills surrounding the Nashik City like Pandu hills (323 MT.) in the eastern end of the Anjeneri- Trimbak range, in southwest, Chamar Caves in the north.

The Godavari emerges from the main Sahyadri ranges near Trimbak just 27 Km. from Nashik in the west. The Godavari River has a fan like drainage pattern; the low gradient of the Godavari River developed on a basaltic surface has introduced meanders and alluvial banks and potholes. The banks have erosion and depositional features. The tributaries of the Godavari eroded the land to reach the base level of the

main stream and have carved out their courses, leaving behind the intermediate portions as mounds, and there are nine hills (Teaks) and so, Nashik has an undulating topography.

The nine hillocks apparently attracted settlement due to the seasonal floods of Godavari and locational sanctity. These hills at present are difficult to trace because of the in filling of hollows and depressions by mud. These hills of Nashik were called Teaks. The Juni Gadi is an eighty feet hill where initial settlement originated and developed. The Navi Gadi or New Fort is the place where the Muslim Courthouse was located. The Kokani Tek was occupied by the Pathan pura. Further towards the west were the Jog Tek, which has Jog Wada in the south, and Dargah in the North. In the west there is Mhasrul Tek and Dingarali hill. There are other smaller teks such as Mahalaxmi Tek, Jama Mosque Tek or Sonarali Tek and Ganapati hill or Ganesh Tek.

It appears that the nine teks of Nashik city are such alluvial mounts, the remnants of the level surfaces eroded by the Saraswati and other right bank stream and the Panchavati area is an alluvial platform parched on the high eroded left bank of lathe Godavari and mark off from the rest of the valley expansion by the entranced Aruna and Waghadi rivers, the mounts attracted early settlers of the Nashik city and the Panchavati area became its counterpart of the other bank of river, with Tapovan as the suitable no expansion. (Kulkarni, 1981)(As shown in Fig. 4.3)
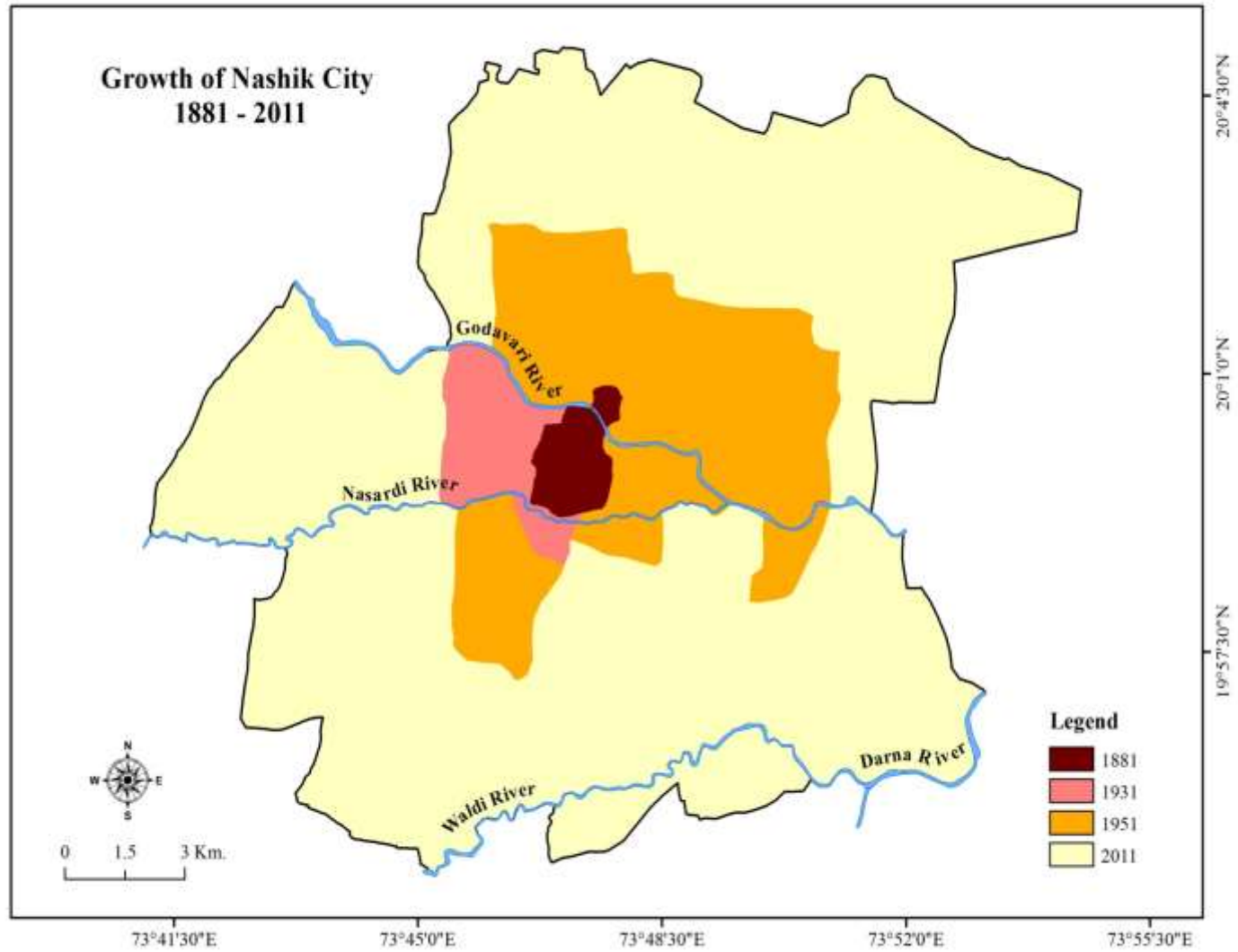
Fig. 4.2
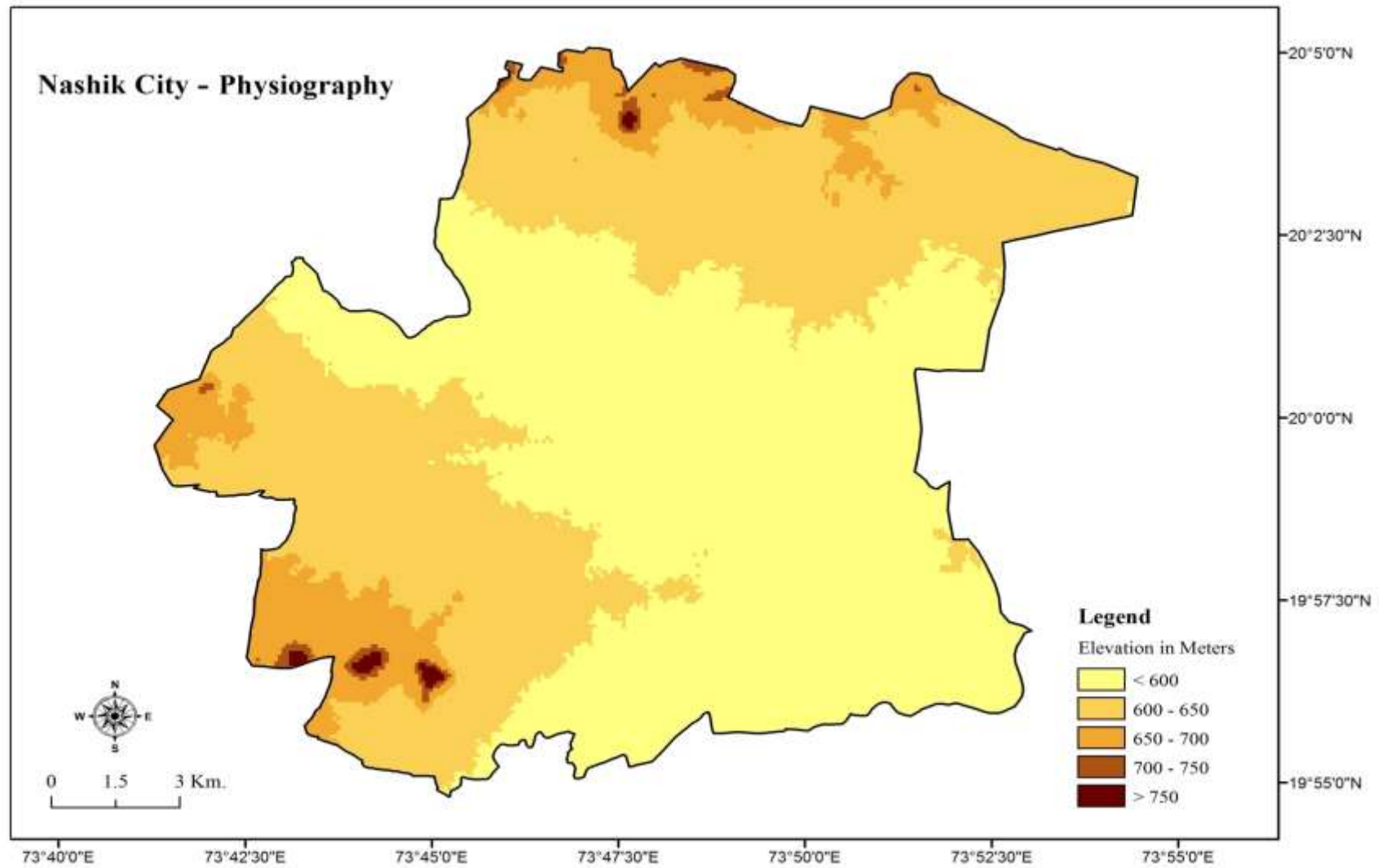
Fig. 4.3

4.5   NASHIK CITY : SOIL

Nashik city is in Nashik District. The great trap region of the Deccan covers the whole district. The volcanic portion consists of compact, stratified basalts and an earthy trap. The basalts are the most conspicuous geological features. (CDP of NMC)

As regards the soil valleys are filled with disintegrated basalt of various shades from grey to black, washed down by rain it is of argillaceous nature. This soil is not favorable for the growth of large trees but it is very fertile for cereals and pulse. The black soil contains high alumina and carbonates of calcium and magnesium with variable amounts of potash, low nitrogen and phosphorus. The red soil is RSS common and is suitable for cultivation under a heavy and consistent rainfall. Generally deep black soil is found in the study region but older alluvium soil with deep cover has been observed in Godavari valley. (Maharashtra State Gazetteer, 1975)

4.6   NASHIK CITY : DRAINAGE

In Nashik Municipal Corporation area a comprehensive storm water drainage system available. The ground slopes are steep in certain areas (Panchavati area), especially near the Godavari and its tributaries. The average low-lying ground level is 569 m. and the highest ground elevation is at 700 m. The old city is located at low-lying areas while the developed areas are mostly on higher grounds. There are 3 main River basins in the study area as under, The Godavari River flows west to East across approx. 18km. through central area of the city. Nearly 8 nallas meet the river Godavari in this stretch. The river Nasardi also flows west to east and joins the Godavari on the south bank at Takli. The river Darna flows at the South – Eastern boundary of the study area, and its tributary Valdevi flows from the North – West to South – East and meets it near Chehedi. The Nasardi, Darna and Waldevi (which meets Darna River) are the tributaries of river Godavari. The drainage pattern lies within the respective ridges of the catchment area. (CDP of Nashik)

The inverted 'S' shaped river valley has influenced the development of Nashik. Core area is situated on the Right Bank of the river, while Panchvati, a traditional settlement is on the left bank of the Godavari River. So the Godavari River has divided the earlier settlement. The city is situated in the area between the Godavari and Nasardi River, which was a well defensive site in the olden days, marked by the Godavari and other numerous streamlets (As shown in Fig . 4.4).
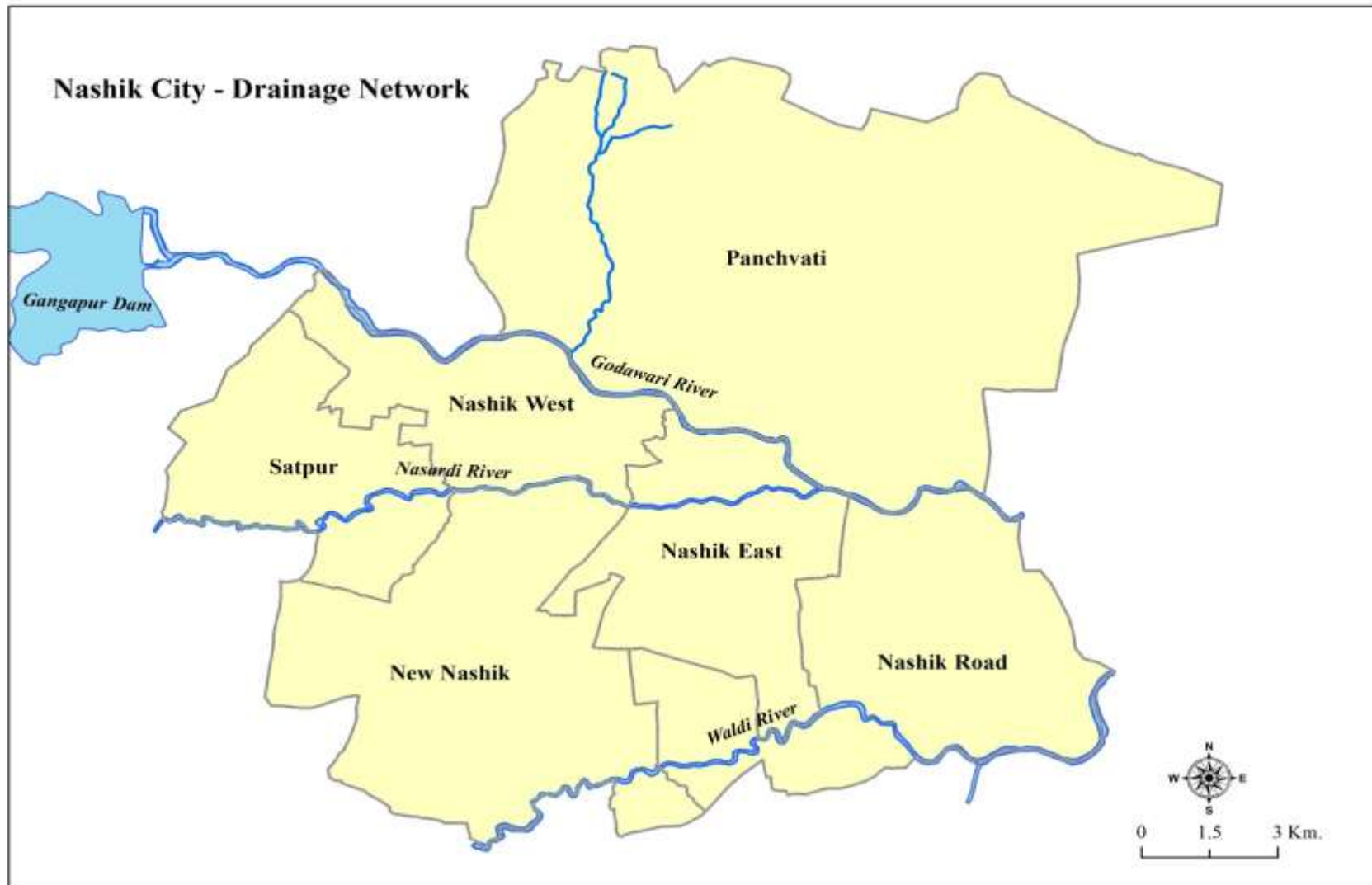
Fig. 4.4

4.7   NASHIK CITY: CLIMATE

Table No. IV-I Gives the clear ideas about Temperature, Rainfall, and Relative Humidity of the study area. These Three factors defines the Climate situation including all season like winter, summer, Pre-Monsoon, Monsoon.

The Climate of Nashik City is favorable for Healthy and Good urbanization. The average maximum temperature is 34^0 C and it is observed Max 44^oC in the two months i.e. April and May. The average minimum temperature is 15° C and it is observed lowest about 3.2^0C and 5.4^0C in the month of December and January respectively. The average annual temperature ranges between 15^0C and 34^0C.

The average rainfall in Nashik City is observed 53 mm and it is highest in month of June and July i.e. 210 mm. The average humidity observed in the study area ranges between 34 % to 92 % and it is observed highest in the monsoon and winter season. Throughout year the evening climate is more clear and free from humidity comparatively the morning session.

TABLE NO. IV-I

NASHIK CITY: CLIMATE (2014)

Months	Rain Fall In mm	Temperature^{0}C		Humidity in Percentage			
				Morning		Evening	
		Max.	Min.	Max.	Min.	Max.	Min.
January	0.0	28.7	5.4	95	58	50	22
February	25	30.5	10.2	90	40	51	19
March	0.0	35.0	11.0	81	22	35	20
April	0.0	41.0	12.5	78	28	60	15
May	0.0	44.0	18.0	85	40	42	17
June	139	39.0	20.0	90	55	98	45
July	210	32.0	20.2	96	73	95	55
August	101	30.0	21.0	97	88	97	70
September	138	29.0	20.0	95	75	93	59
October	20	35.3	18.0	97	73	83	32
November	2	30.5	15.4	99	63	81	37
December	0.0	28.0	3.2	95	67	62	25
Average	**52.91**	**33.58**	**14.58**	**91.5**	**56.83**	**72.25**	**34.67**

Source: Hydrology Department Meri, Nashik (2014)
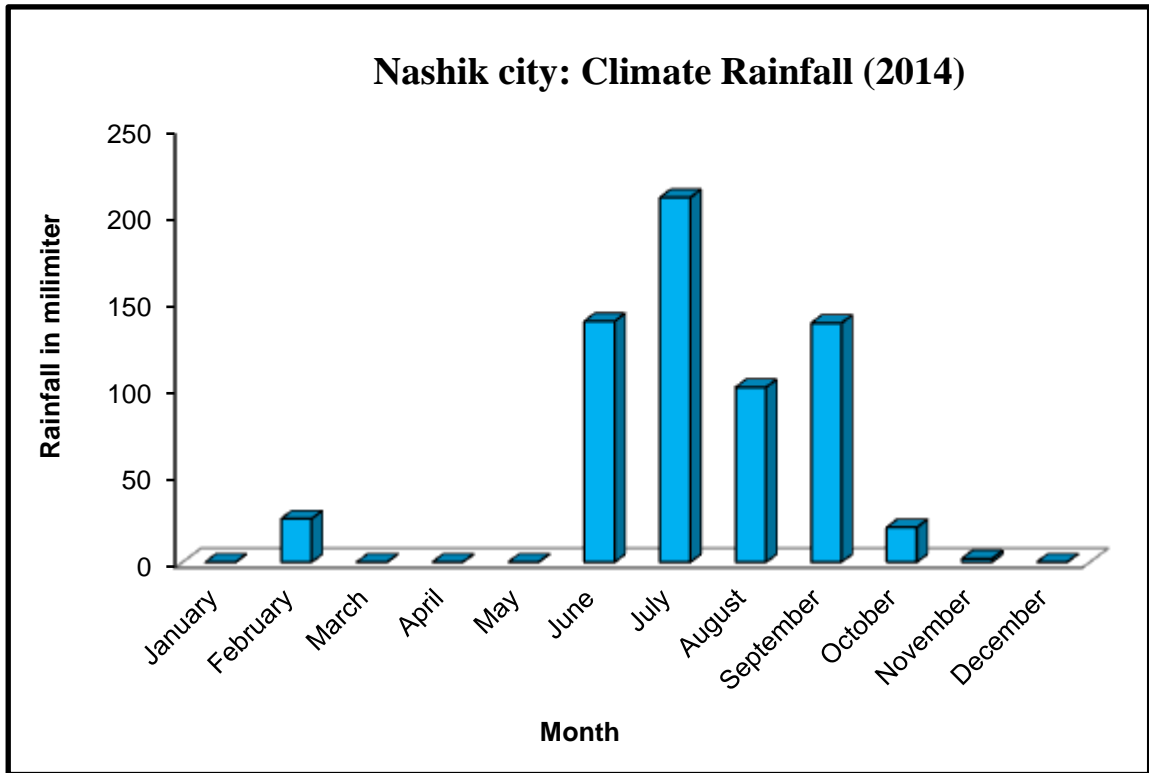
Fig. 4.5
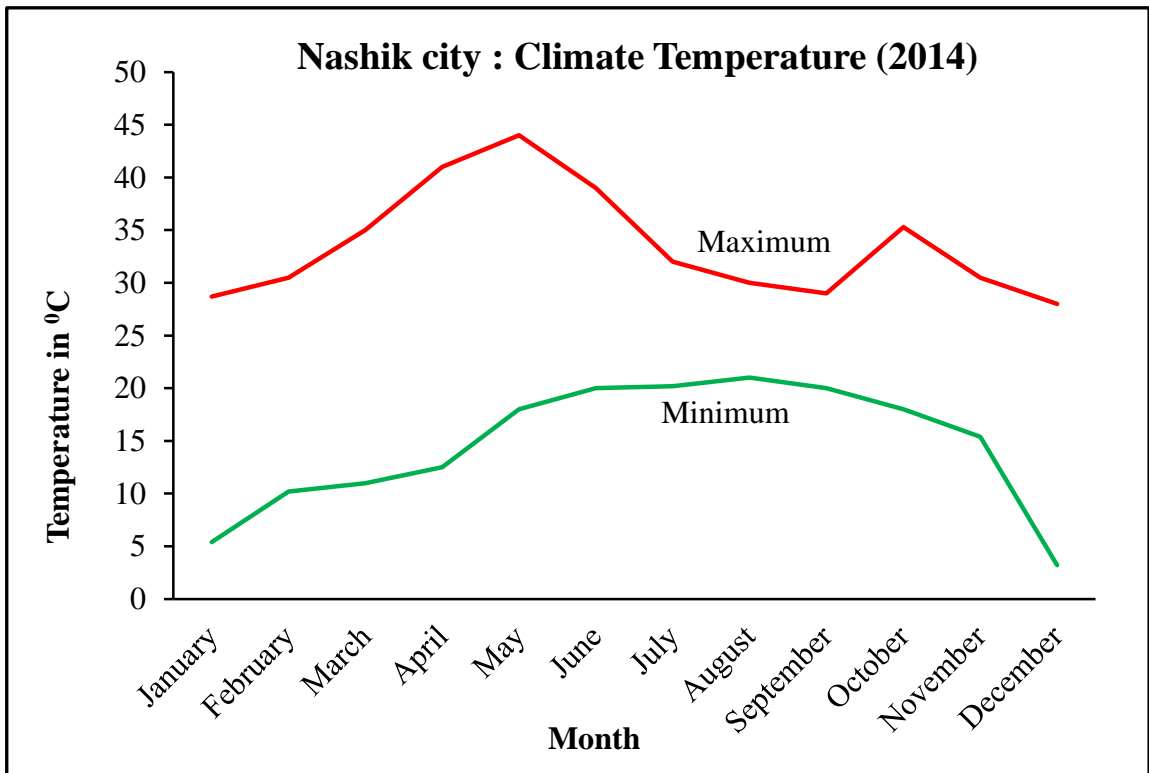
Fig. 4.6

Fig. 4.7

Fig. 4.8

40
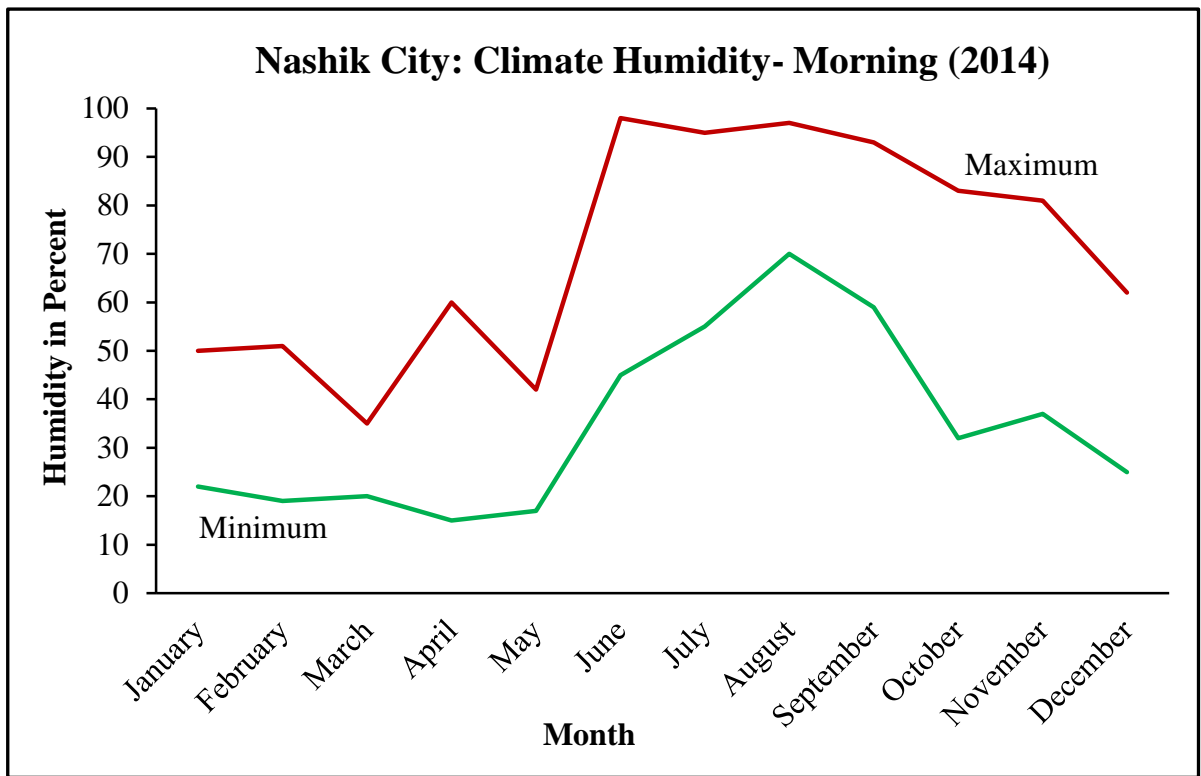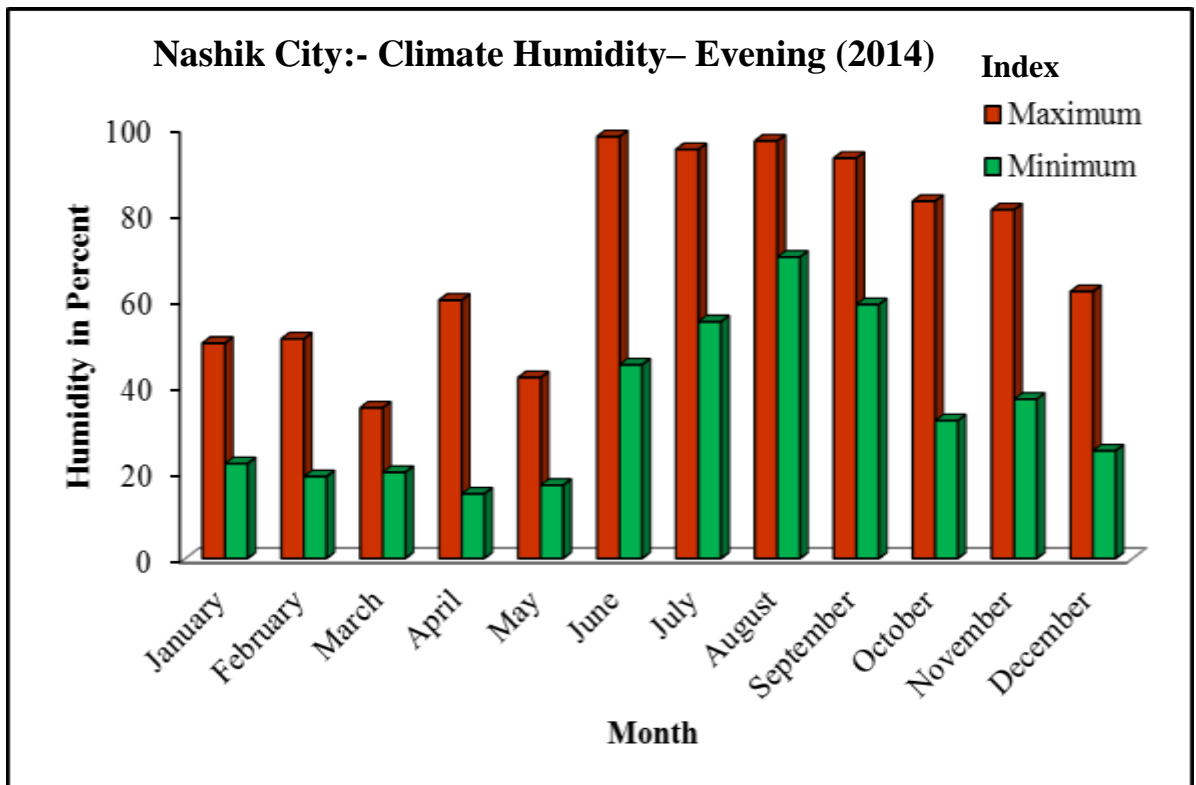
4.8   NASHIK CITY: LAND USE PATTERN (2014)

For urban areas, distribution of land as per various urban needs is most important factor to develop healthy urbanization. When the planner designs a town planning, it is most essential for him to keep a social view. It should be include all urban area's need like residential, commercial, industrial, agriculture etc. as per future expansion of that city.

The classification of different zones with their area and per cent to total area for study region is as follows- shown in Table No. IV-II, Fig. 4.9 and Fig. 4.10

TABLE NO.IV-II

NASHIK CITY: LAND USE PATTERN (2014)

LAND USE	AREA IN HA.	% OF DEVELOPED AREA	% OF TOTAL AREA
Residential	8255.30	49.22	31.86
Commercial	452.00	2.69	1.74
Industrial	2661.75	15.87	10.27
Public/ semi public	408.25	2.43	1.58
Transport and communication	2799.30	16.70	10.80
Garden/ Recreation	501.25	2.99	1.93
Public utilities	350.00	2.09	1.35
CIDCO	398.00	2.38	1.54
Military	943.70	5.63	3.67
Water Bodies	655.00	-----	2.52
No Development Zone	8484.05	-----	32.74
Total	**25910.00**	-----	**100**

Source: Town Planning Department, Nashik Municipal Corporation, Nashik.(2014)

Fig. 4.9

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Nashik city: Landuse Pattern (2014)

Legend:
- Residential
- Commercial
- Industrial
- Public/ semi public
- Transport and communication
- Garden/ Recreation
- Public utilities
- CIDCO
- Military
- Water Bodies
- No Development Zone
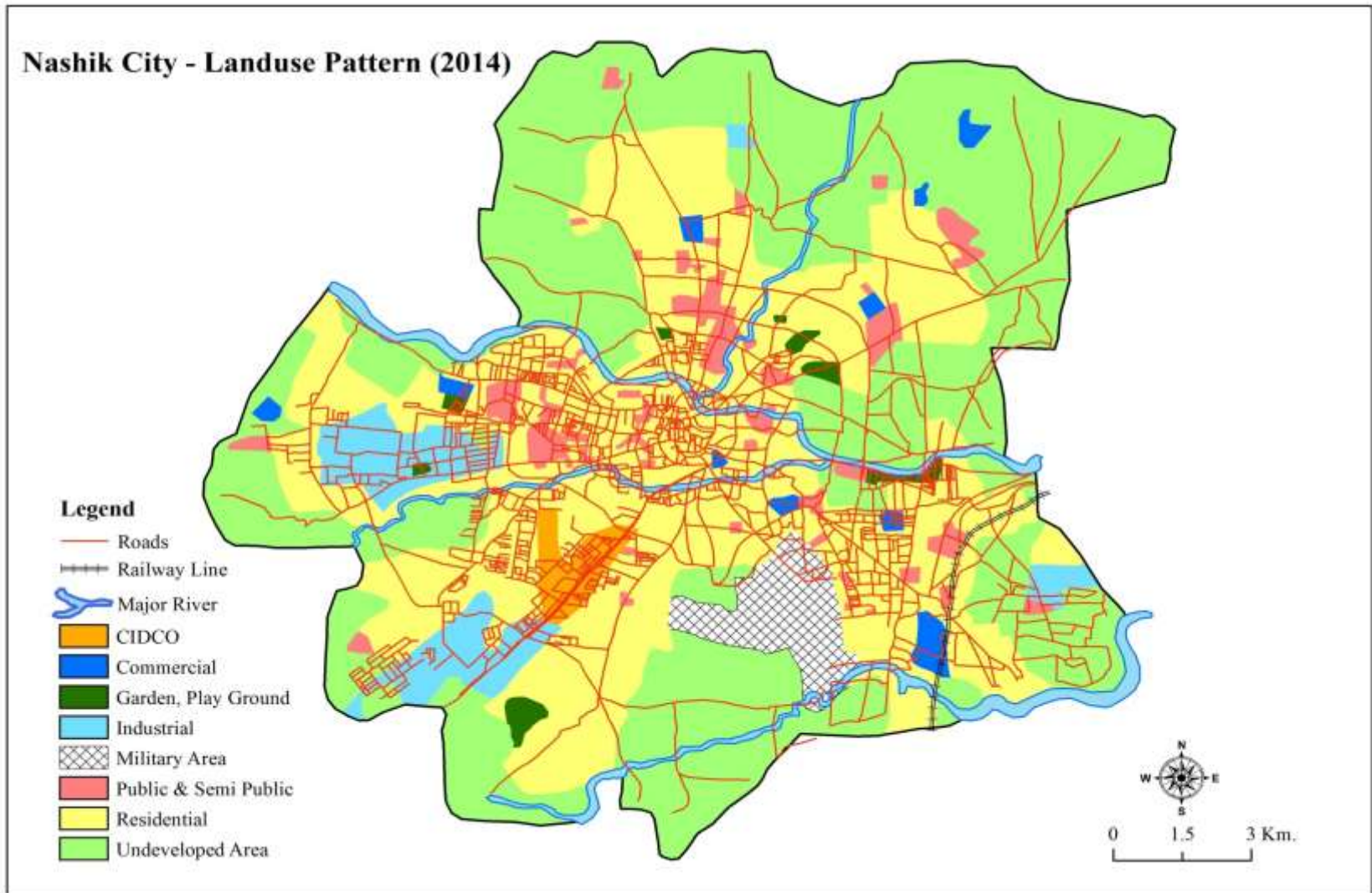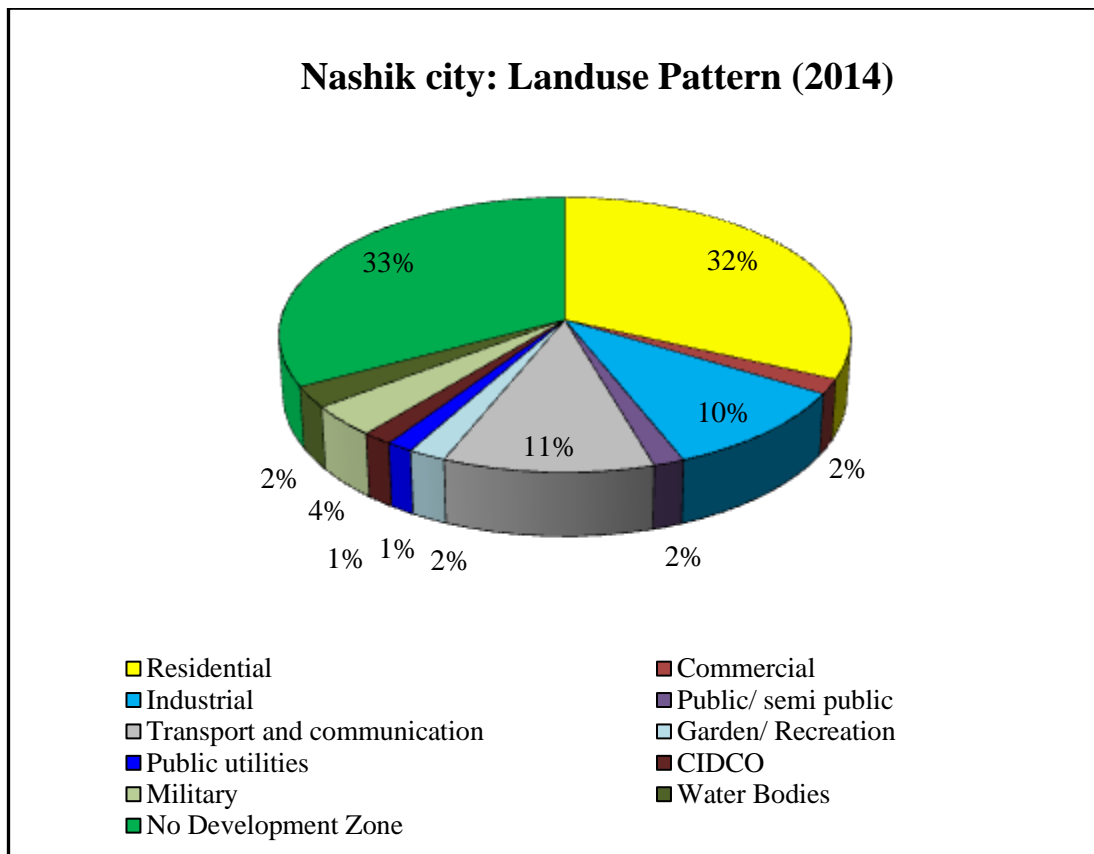
Fig. 4.10

The land use pattern of Nashik city has been divided into two i.e. developed area and undeveloped area. The undeveloped areas contain 32.74 per cent area of the city. In the developed region the residential area occupies 31.86 per cent of the study area. The public and semi-public, transport and communication both account for 1.58 per cent and 10.80 per cent respectively. The commercial, Industrial, Garden and recreation occupy less area i.e. 13.94 per cent of the total area. The military occupied 943.70 hectares, CIDCO 398 hectares, and the area of water bodies 655 hectares i.e. 2.52 percent of total area.

B)   HISTORICAL EVOLUTION-AND GROWTH OF NASHIK CITY:-

The Nashik city developed under historical and religious factors. The influence of different rulers in different periods also affected its growth besides the topographical factors. Various periods from pre-historic to modern through epical, Historical, Muslim, Maratha and British period left their marks on the development of the city.

4.9   DIFFERENT NAMES OF NASHIK:-

Nashik is one of the ancient cities of India and the origin of the city's name and the subsequent changes in it can only be derived from available literature. As per

the records in the early Hindu scriptures, the city was known as 'Padmanagar' or lotus city, during 'Krita Yuga', 'Trikantak' in Treta Yuga (Trikantak mean three peaked city as it grew over three hills in the right bank of the river Godavari) It became 'Janmasthana' during 'Dwapar Yuga' when the city area was expanded at the cost of receding forests and the city became populated with the advent of Kali Yuga, the city came, to be called as 'Nashik' or 'Navshikh', the nine mounds, on which the present city grow.

Nashik got its name during the Ramayana period, during Rama's 14 years exile, some part of it he spent in Nashik. Shurpanakha, the sister of the demon Ravana had proposed to marry Rama. Hearing this Rama ordered Laxman to cut off Shurpankha's nose (Nashika). Thus Nashik got its name. But still in earlier times it was known as 'Trikantak' (in Kritayuga), 'Janasthana' (in Dwaparyuga), 'Gulshanabad' (during Mughal rule in 1487 A.D. and it was famous for its roses). During the rule of the Peshwas it was renamed Nashik. The Peshwas (Raghobadada and his wife Anandibai) settled at Anandwalli in Nashik where they built…... (Nashik City: An Urban History)

4.10   NASHIK DURING ANCIENT PERIOD:

The city of Nashik is hallowed in Brahmanical tradition because of its association with Ram during his exile in the Deccan. The early history of Nashik begins in 4th and 3rd century BC with dynasty of Mauryas. The history of Satvahanas is principally based on coins and inscriptions of their contemporaries. Archaeological evidences reveal that Nashik undoubtedly is a very ancient city.

Nashik as an ancient town has been missed by travel account of Fa-hein, Huen-Tsang and I. Tsang. It is only the Greek Egyptian geographer Ptolemy who has made a mention of Nashik in an account which dates back to at least 150 AD. Ptolemy speaks about Nashik as a part of the country, situated to the east of river Narmada.

Since the mention of Nashik does not occur in the Ramayana, the tradition connecting it with cutting off the nose and ears of Surphanakha by Lakshaman remain simply a popular belief without any relevance to history.

The earliest historical mention of Nashik City is about 200 BC, found in an inscription on the Bharhut Stupa in Madhya Pradesh about 160 kms northwest of Jabalpur. The inscription reveals that about 125 to 200 BC, Nashik city was of sufficient political importance to be the seat of an officer styled the minister of

religion; perhaps the whole Deccan was also a place of trade appearing to have merchant guilds. In this way Nashik as a trade and religious Centre remained a place of importance, meriting a mention of 'Nashika' by Ptolemy around 150 AD.

In the early Hindu period Nashik rose to prominence as Centre of pilgrimage mainly due to its location on the river Godavari and its incorporation in the Purana tradition. Nashik's connections in the Ramayan narrative deserve special mention even today. Many places in and around Nashik City have been associated with Rama, particularly places like Tiundha, Panchvati, Sita goompha, Ram's Panchratneshwar, Janak's Nilkantheshwar.

The importance of Nashik was also recognized by the Jains and the Buddhist during 200 AD and 600 AD. Buddhism was dominant in this part during this period where the landscape expresses it in form of caves beautifully cut and carved out of rocks of this region popularly known as Pandav leni. During A.D. 500, Varamihir, the astronomer mentions Nashik City as one of the cities included in India or Jambudwipa.

4.11   NASHK DURING MUSLIM PERIOD: (1300 to 1670)

Nashik City was known as Gulshanabad, a city of roses. It was made the headquarters of a division. The geographical area of Gulshanadbad was limited to the nine moods, during this period the city was fortified and new fort or Navi Gandhi was constructed which housed the Governors lodge as well as office. The gates such as Delhi Darwaja, Kazipura Darwaja and the Jamma Masjid were built with the stones of demolished Hindu Temples by the Muslims.

It was during the Muslim period that various puras such as Kajipura, Multan pura, Naikwadi pura, Monin pura, Bagwan pura, Pathan pura, Kokni pura and Kalal pura were added to the landscape of Nashik city. Some of the remnants of the buildings and darvajas, build during the Muslim period are yet to be seen in the old fort or Juni Gadhi of Nashik city.

4.12   NASHIK DURING PESHWA PERIOD: (1760 to 1818)

The country around Nashik City Passed on in the hands of the Peshwas during 1751-52 and Gulshanabad was renamed as Nashik. In the middle of the core areas or the head of main *bazaar* road, the Peshwa's palace or Sarkarwada was built (The same building was used as a Police Station and a Public library). Many of the temples, ghats, kunds on the banks of the river Godavari and the mansions which are

popularly known as wadas were built during this period. Some of the important Ghats were also built during this period.

The Peshwa and the Sardars settled in the new area called Navapura to the north of the Sarasvati stream and had mansion and wadas enclosed by gates such as Mother Gate, Sati gate, Hatti gate and Nav gate. Till 1790, Nashik City was the headquarters of a subdivision of Sangamner. It was during the Peshwa period that Anandibai, wife of Peshwa Raghunathrao, made a futile effort to develop Nashik city. A village was named after her, Anandvali, 5 kms in the west of the Nashik city.

4.13 NASHIK DURING BRITISH PERIOD: (1818 to 1947)

In 1818 after the defeat of Peshwas, the city of Nashik came under British. The British extended the city's space with construction of administrative buildings like collectors office, the criminal and civil courts, the Land and Revenue offices, the- Police Headquarters, Parade grounds, a little away but within the reach of the city. The British also added Muslim schools (the present Pethe Vidyalaya), Hospital (Canada Hospital presently used as Telecommunication Head office) libraries, Golf Club, officers Bungalow and gardens (Shivaji garden) which are still in good condition.

The British created a municipal organization in 1864. Even today, the buildings constructed during the British rule, stands out from the other structures distinctively. The extensions during the British period were mainly on the west of Navapura. 12 bungalows or the Bara Bungalows and the houses of the Government Officers built by the British still exist at Trimbak Road

4.14 NASHIK AFTER INDEPENDENCE PERIOD: (1947 to on words)

After independence, Nashik's Population has crossed one lakh and the real breakthrough in its rapid development was development of N.I.C.E. and M.I.D.C., modern industrial areas in 1962. The earlier industrial development was mainly in the form of rice mills, saw mills and copper utensils manufacturing units, printing press, cotton ginning mills, bidi and cement-tiles manufacturing units etc. The development of Satpur industrial area encouraged rapid industrial growth and suburbanization of the city area in the western direction. The process of suburbanization became rapid due to development of suburbs like Satpur, Anandvalli, Gangapur and development of Ranenagar in 1970 onwards. During this period, Nashik City and Nashik Road were developing towards each other. NashikRoad developed its suburbs like Dasak and Panchak.

In 19th century, under British rule, City acquired a Civil Lines, a Railways Station and a Cantonment at Deolali and became a complex of urban places with tremendous development of infrastructure and also acquired 'the status of a Municipality. In 20th century, (last forty years) Nashik was slowly coming into main stream of urban process, mainly attributed to its closeness to Mumbai and industrial growth, Nashik is striving to be a modern metropolis without discarding the sacred geography and its legendary status.

In the year 1981, Nashik's population increased up to four lakh. Today Nashik City with industrial suburbs like Satpur, Ambad and Eklahare (Thermal Power Station) has a special action. There are also well- developed residential suburbs in vicinity. In short, the process of decentralization of actions became rapid in 70's. The core area became urban advice area with dominant commercial function. In short, the multifunctional growth and segregation of function started after 1971 and today it is sixth largest city in the state of Maharashtra.

Growth of Nashik: After British Period the new features like industrial units were planned and up planned shops and markets, residential buildings both cooperative and housing societies and independent bungalows. One the hall mark of Post-British welfare as outward expansion of the urban landscape is mainly the important roads. Besides this there was a spatial temporal growth of commercial establishments from the core area to the newly developed residential extensions.

The above mentioned is the rapid expansion in the spatial extent of Nashik City. The location of industrial estates in 1962 at Satpur, Government of India security Press in 1924 at Nashik Road and Currency Press during 1928 at Nashik Road, the Railway station in 1861 at Nashik Road have influenced the spatial growth of the city along with its form. The phenomenal growth during the decade 1941-51 could be mainly attributed to the Government policy of rehabilitation of refuges.

4.15   SINHASTA- KUMBHAMELA NASHIK :

The most spectacular of all the events, the Kumbh Mela is a religious festival that occurs once after every 12 years, and is celebrated in four major pilgrim centers around the country. In Maharashtra, the festival is celebrated in Nashik, Trimbakeshwar. The Nashik Kumbh Mela is generally acknowledged to be the most sacred festival. Nashik has a rich historical past.

In Kruta Yuga, Durwas Rishi saw Indra - the King of Gods - sitting on elephant Airawat. Durwas was happy to see Indra and presented him a chain. However Indra did not accept the gift. It fell down and was trodden by the elephant, Airawat. Durwasa Rishi got upset due to this and cursed Indra. As an effect of the curse, all Gods lost their powers and had to often lose battles against Danavas (Demons). So all Gods, including Brahmadeva surrendered themselves to God Vishnu to get back their powers. Vishnu suggested them to approach Danavas and persuade them to perform Samudra Manthana (churning of the sea). He said Samudra Manthana will bring out Amruta, which will bring back your power and you will not be affected by Danavas. So Samudra Manthana was carried out. One of the many precious things that arose from the depths of the troubled waters was a pot of nectar (Amrit Kumbh). Lord Vishnu, disguising himself as an enchantress (Mohini), seized the nectar from the demons. While fleeing from the evil ones, Lord Vishnu passed the nectar on to his winged mount, Garuda. The demons finally caught up with the Garuda and in the ensuing Struggle, a few drop of the precious nectar fell on Allahabad, Nashik, Hardwar and Ujjain. Since then, the Kumbh Mela has been held in all these places, every 12 years.

Another story is that once all the Teerthas went to Adinath Bhagwan Shankara. Following Bhagwan Shankara's order they had been to Mrutyuloka (earth) to save sinners on earth. Teerthas absolved the sinners on the earth, but were themselves saturated with others' sins. They requested Bhagwan Shankara to free themselves from sins. Shankara asked them to go and live in solitude for one year at the bank of river Godavari. Shankara promised the Teerthas that he himself, with all other Gods would also stay with them. After taking bath in the sacred water of Godavari, they shall be free from their sins.

Hence during the Kumbha Mela a dip in Godavari River has attained a great importance. In Shiva Purana there is a story explaining the importance of Sinhasta Kumbha Mela. Gautama Rishi got salvation of his cow-killing sin from Lord Shankara after a long penance. Then the river Ganges the Rishis present there and all Gods will stay with her. Then only will she stay back. Gods and Rishis promised her that during the period, when Jupiter and Sun will be in the zodiac sign Leo (Simha Rashi), they shall all stay on the earth. In later years, it is descended down on the earth. After some time she wanted to go back to her home place. However the Rishis and Gods gathered there and requested her to stay back on the earth for the prosperity

of the earth. She agreed to stay back only after taking a promise from Lord Shankara that all said that, acknowledging importance of Kumbha Mela. (CDP of Nashik)

Lord Rama with his Guru Kashyap lived for one year in Trimbakeshwar. During this period he performed all the religious rites like yatra, shraddha etc near Kushavarta. Amrut had to be saved from Danavas. So Gods had to hide it at different places - Swargalok, Mrutyulok and Patallok. Gods were on Mrutyulok (earth) for twelve days. Gods twelve days are equal to 12 years for Mrutyulok. Thus Gods were on earth for 12 years with Amrut. Hence every 12 years Kumbha Mela is celebrated at the four places, where a few drops of Amrut had fallen. Kumbha Mela is a mammoth fair where saints and devotees gather. Kumbha Mela is celebrated at the aforesaid four places depending on the positions of planets and stars. When Jupiter (Guru) and Sun are in zodiac sign Leo (Simha Rashi) it is celebrated in Trimbakeshwar, Nashik.

The Sinhasta - Kumbha Mela at Nashik is a mammoth affair in its gorgeous form. It is the greatest assemblage of people gathered together in a confined space i.e., the banks of Godavari and at the holy Ram kund and Kushavartha reservoirs, for a dip into the holy waters. It is an affair of the priests and the ascetics who have kept this tradition continue as it was formed three centuries or ten centuries ago. (Verma, 2010)

The word 'Kumbha' means an urban and 'Mela' means a fair. The festival celebrates one of the creations myths of Hinduism. Brahma, the creator, was floating on the primeval ocean in a trance. When he awoke, he started to create the universe. The gods and the demons decided to start the process by churning the ocean. They used a mountain as the churn and a giant snake as the rope to rotate it. As the ocean frothed, miraculous gifts appeared. The most valuable was an urn of nectar, which can make anyone immortal. The demons grabbed the urn but the son of Indra, who ruled the heavens, managed to spirit it away from them. Disguising himself as a rook, he flew over the earth, chased by the demons. It is being said that during his flight to the abode of gods he rested at four places – Nashik is one of that four places. Others say that the drops of nectar fell on four places during the flight on the earth. The son of Indra took twelve days to fly to paradise, as one day of gods is equivalent to a year in the life of mere mortals, Kumbha Melas are held in all four places once every twelve years. (Tully, 2002)

*   URBAN TRANSPORTATION SYSTEM OF NASHIK CITY.

4.16   URBAN TRANSPORTATION SYSTEM OF NASHIK CITY:-

Nashik city is the Headquarters of Nashik Administrative division which comprises of five districts. Nashik is situated 185 km from Mumbai and 200 km From Pune. It is thus part of golden triangle of Maharashtra viz. Mumbai-Pune-Nashik. The National highway No.3 i.e. Mumbai-Agra road connects Nashik to important cities Mumbai and Dhule and national highway No.50 connects Nashik to Pune. Nashik also has good railway connectivity as it is situated on the main line of central railway on Mumbai-Bhusawal section. In addition to this, four state highways i.e. Nashik-Dindori-wani (SH-11), Nashik -Peth (SH-12), Nashik- Aurangabad (SH-60), Nashik-Trimbak (SH-4) also provide additional connectivity termer. Two state highways connect Nashik to Gujrat state. One Major river i.e. Godavari flows through the city and its three tributaries i.e. Darana, Nasardi and Waldevi also flow through study area.

Nashik Municipal Corporation is spread over 259.10 Sq. Km. Such a large area in broadly divided into six distinct division geographically. Each of the following division has their arterial roads and their link roads with other division. Besides these roads, there are inner and outer ring roads as per the sanctioned development plan of Nashik (sanctioned in 1993) which are partly developed by Nashik Municipal Corporation. Thus existing road network of Nashik Municipal Corporation is based on all these roads. (CDP of Nashik)
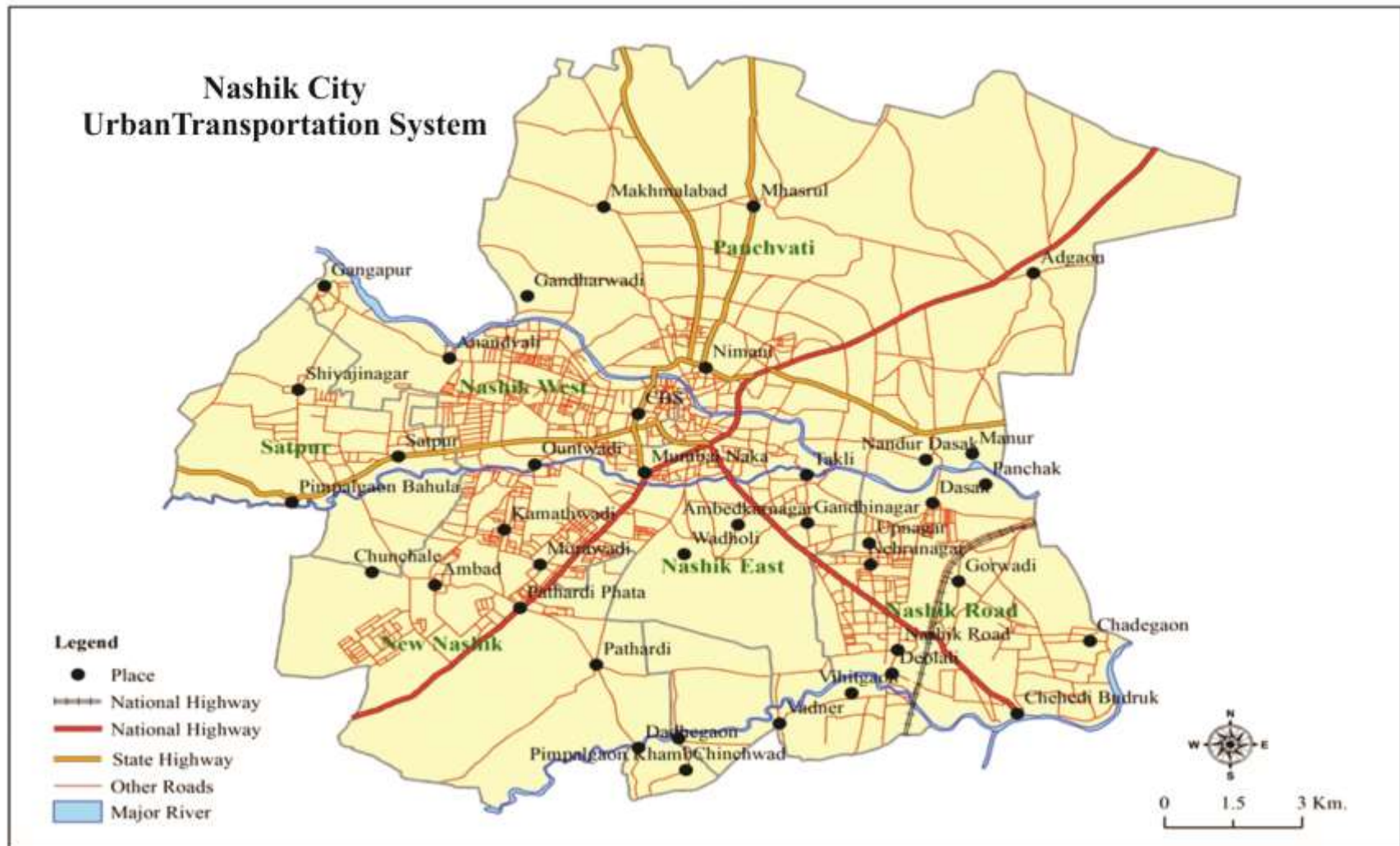
Fig. 4.11

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4.17   GROWTH OF VEHICLES:

Now-a-days, there is rapid growth of automobiles compared to the last decade. So it is called as an automobile decade, because Number of the motor cycles, mopeds and scooters/Scotties has grown rapidly. The number of four wheeler vehicles is also changing rapidly.

In the study region, it is observed that, out of the total vehicles, nearly 56.50 per cent are motor cycles. It means that the people use private vehicle for transportation in the study region. The scooter vehicles rank second and account for 16.79 per cent of the total vehicles. The mopeds vehicles rank third in the two wheelers and share about 0.36 per cent of the total. Two wheeler vehicles share about 73.6 per cent of the total vehicles.

The motor car ranks third in the total vehicles, i.e. 13.91 per cent of the total. The number of motor cars has been increased in last five years. The tractors rank fourth in the total vehicles, i.e. 6.4 per cent of the total. The delivery vans 3.94 per cent and travels (0.73 per cent) rank next. The other vehicles account very low percentage of the total. The Table No. IV-III and Fig.4.12 give clear idea about the present position of the vehicles in the study region.

In the study region as per Nashik city R.T.O. office record, it is observed that there are 1052901 no. of total vehicles registered up to 2013 and total vehicles registered up to year 2014 were 1154243. The motorcycle has same growth averagely i.e. 56.60 per cent out of total vehicle percentage. The scooter vehicle ranks second and has 13.07 average percentage of total vehicle percentage; it has also maintained the same growth in percentage. Moped vehicle ranks third in the two wheeler and share same percentage growth i.e. avg. 4.58 percentage. Two wheeler vehicle's share is about 74.24% of total vehicle; it shows that the people use their private vehicle for transport in the study region.

The motor car ranked third in the total vehicles maintaining same % growth of all vehicle per cent i.e. 9.48 per cent average. The no. of motor car increases rapidly and has constant per cent. The tractor maintaining its fourth rank i.e. 4.49 per cent average of total vehicle per cent, the trailer is next having 2.32per cent of total vehicle. The other categories are comparatively lower in per cent of total per cent. Table No. IV-IV and Fig4.13 gives clear idea about similar constant vehicle growth occurs in study region.

NASHIK CITY: REGISTERED VEHICLES (MARCH 2013-2014)

SR. NO.	NAME OF THE VEHICLE	REGISTERED VEHICLE YEAR 2013-2014	REGISTERED VEHICLE PERCENTAGE % YEAR 2013-2014
1	Motor cycles	57263	56.50
2	scooters	16964	16.74
3	Mopeds	365	0.36
4	Motor car	14099	13.91
5	Jeeps	0	0.00
6	Station Wagons	1	0.00
7(a)	Meter Fitted	1	0.00
7(b)	Tourist cabs	90	0.09
8	Auto Rickshaws	292	0.29
9	Stage Carriages	13	0.01
10	Cont. Carriages/Mini bus	149	0.15
11	school Buses	90	0.09
12	Pvt. Service Vehicles	0	0.00
13	Ambulance	56	0.06
14	Arti. and Multi.Veh	0	0.00
15	Trucks and Lorries	458	0.45
16	Tankers	30	0.03
17	Delivery Van (4 Whl.)	3316	3.27
18	Delivery Van (3 Whl.)	674	0.67
19	Tractors	6481	6.40
20	Trailers	738	0.73
21	Others	262	0.26
	Total	**101342**	**100.00**

Source: R.T.O. Divisional Office, Nashik (2013-2014)

Nashik city: Registered Vehicles (March 2013 - 2014)

Legend:
- Motor cycles
- scooters
- Mopeds
- Motor car
- Jeeps
- Station Wagons
- Meter Fitted
- Tourist cabs
- Auto Rickshaws
- Stage Carriages
- Cont. Carriages/Mini bus
- school Buses
- Pvt. Service Vehicles
- Ambulance
- Arti. & Multi.Veh
- Trucks & Lorries
- Tankers
- Delivery Van (4 Whl.)
- Delivery Van (3 Whl.)
- Tractors
- Trailers
- Others
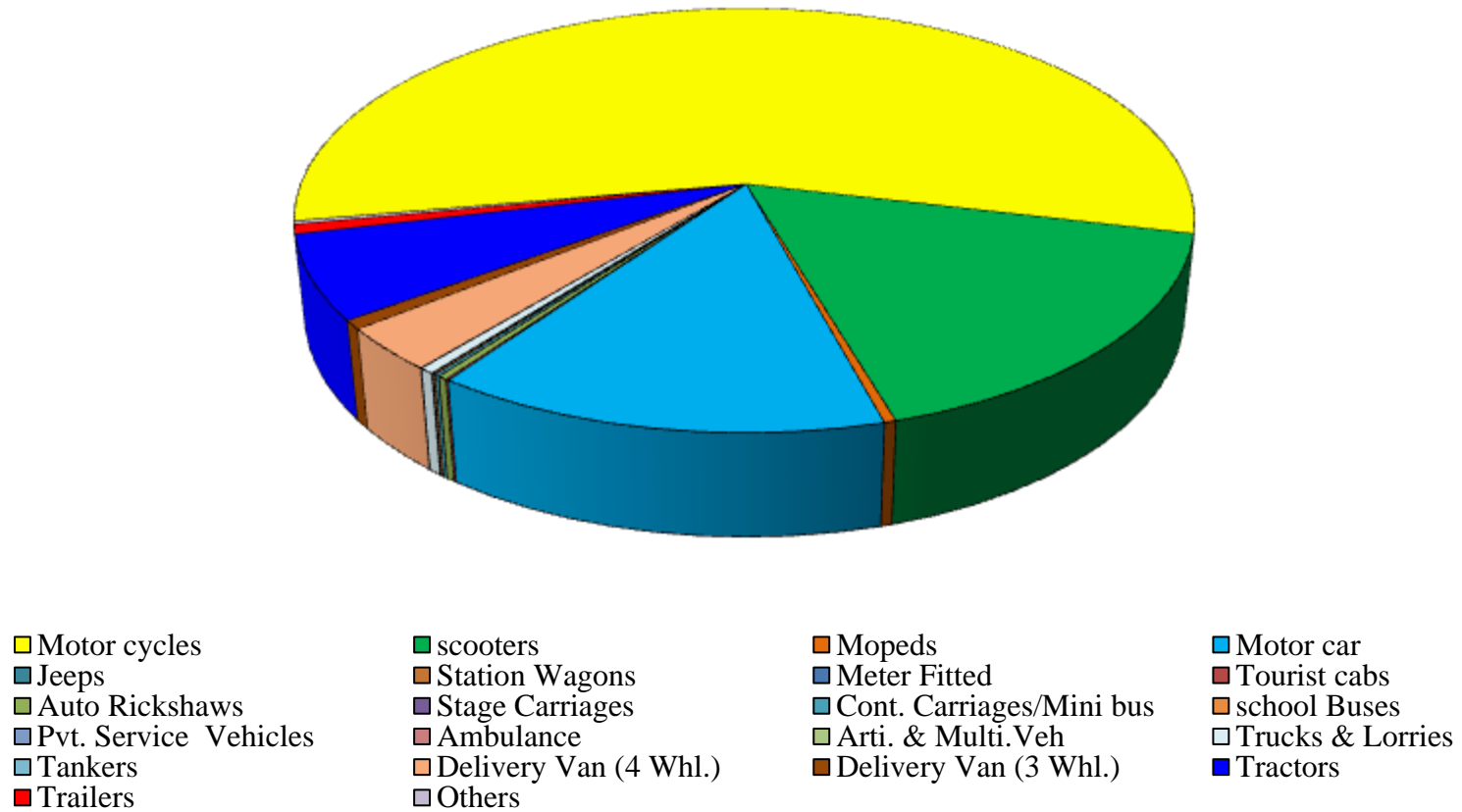
Fig.4.12

TABLE NO. IV-IV

NASHIK CITY: REGISTERED VEHICLES

(AS ON 31ST MARCH 2013 AND 2014)

SR. NO.	CATEGORY	REGISTERED VEHICLE AS ON 31-3-2013	REGISTERED VEHICLE AS ON 31-3-2014	(%) UPTO YEAR 2013	(%) UPTO YEAR 2014
1	Motor cycles	596009	653272	56.61	56.60
2	scooters	135811	152775	12.90	13.24
3	Mopeds	50190	50555	4.77	4.38
4	Motor car	97710	111809	9.28	9.69
5	Jeeps	26532	26532	2.52	2.30
6	Station Wagons	93	94	0.01	0.01
7a)	Meter Fitted	2101	2102	0.20	0.18
7b)	Tourist cabs	2406	2496	0.23	0.22
8	Auto Rickshaws	19401	19693	1.84	1.71
9	Stage Carriages	926	939	0.09	0.08
10	Cont. Carriages /Mini bus	980	1129	0.09	0.10
11	school Buses	480	570	0.05	0.05
12	Pvt. Service Vehicles	203	203	0.02	0.02
13	Ambulance	476	532	0.05	0.05
14	Arti. and Multi.Veh	36	36	0.00	0.00
15	Trucks and Lorries	11032	11490	1.05	1.00
16	Tankers	752	782	0.07	0.07
17	Delivery Van(4 whl)	22827	26143	2.17	2.26
18	Delivery Van (3 whl)	8298	8972	0.79	0.78
19	Tractors	46365	52846	4.40	4.58
20	Trailers	25192	25930	2.39	2.25
21	Others	5081	5343	0.48	0.46
	Total	**1052901**	**1154243**	**100.00**	**100.00**

Source: - R.T.O Divisional office, Nashik (March 2013-2014)
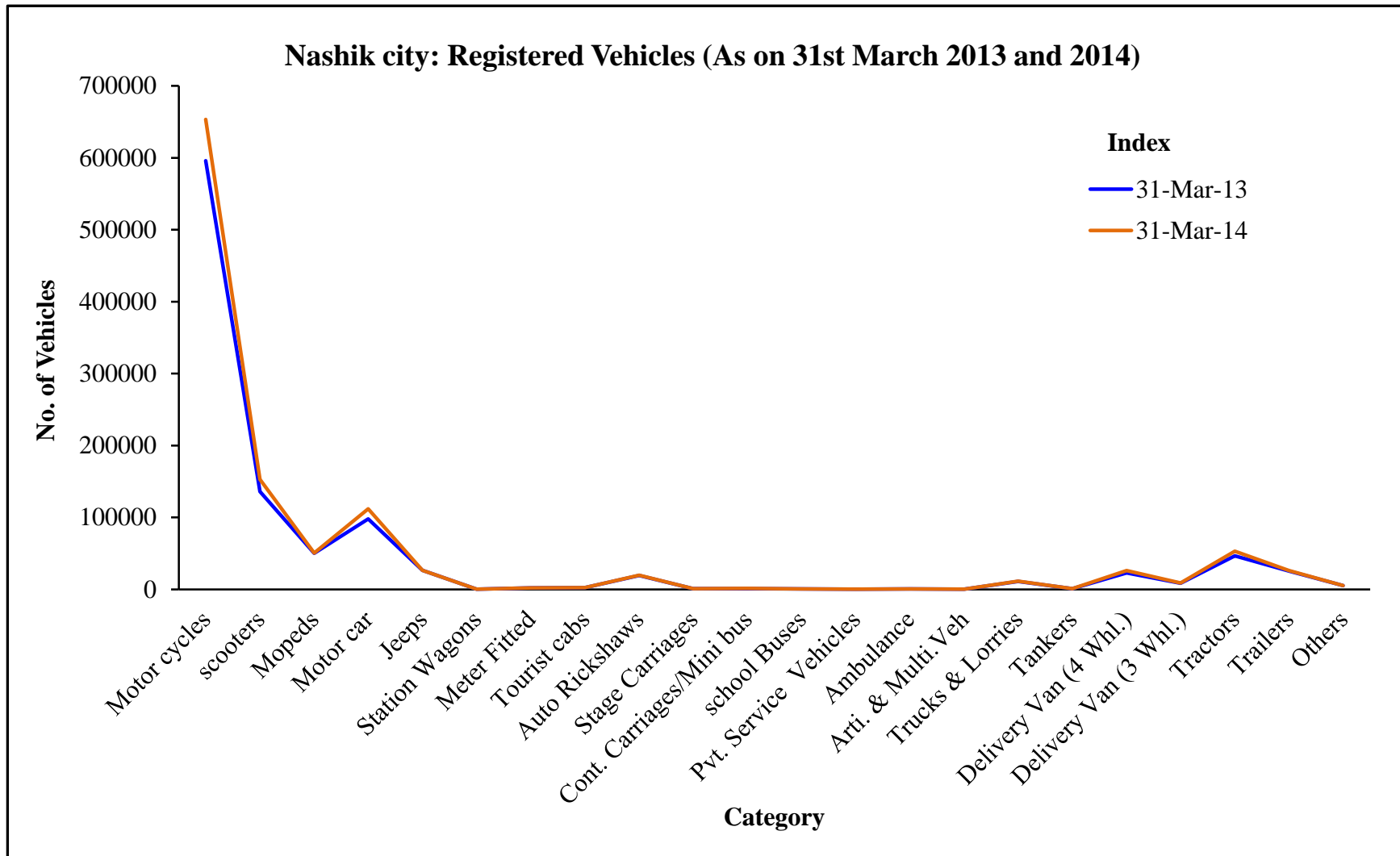
Fig.4.13

4.18 DIVISION-WISE DISTRIBUTION OF RICKSHAWS AND RICKSHAW STOPS:-

The division-wise distribution No. of rickshaw and their stops, in the study area are uneven. Number of rickshaws allowed at rickshaw stops varies from 20 to 56. In the study region Nashik road division, Bytco *chowk* and its surrounding area have more capacity of rickshaws per stop.

The Nashik East, Nashik Road and Panchavati division have more number of stops i.e. 56, 45 and 44 respectively. (As shown in Table No. IV-V) these three divisions are located near Nashik road railway station and C.B.S. The Nashik West, New Nashik and Satpur division have 38, 36, and 23 rickshaw stops respectively. The Nashik West division is located on the western part of College road, New Nashik division is located in the southern part and Satpur division is located in south-west of the study region, where rickshaw stops are located on the main roads of C.B.S, railways stations, Zillah Parishad, Collector's Office, District Court and M.I.D.C area.

The number of rickshaws per rickshaw stop varies from division to division. In Nashik Road division due to the Nashik road railway station the highest number of rickshaws 466 (21.38 percent of the total) are observed. The Nashik West division is located near College road. ranks seconds, which has 17.80 per cent of rickshaws. (As shown in Fig. 4.14 and Fig. 4.15)

TABLE NO. IV-V

NASHIK CITY: DIVISION-WISE DISTRIBUTION OF RICKSHAWS AND

RICKSHAW STOPS (2014)

SR. NO	DIVISION	NO. OF RICKSHAW STOPS (A)	NO. OF RICKSHAWS (B)
1	NASHIK EAST DIVISION	56	361
	%	23.14 %	16.56%
2	NASHIK ROAD DIVISION	45	466
	%	18.60 %	21.38 %
3	NASHIK WEST DIVISION	38	388
	%	15.70 %	17.80 %
4	NEW NASHIK DIVISION	36	365
	%	14.88 %	16.74 %
5	PACHAVATI DIVISION	44	385
	%	18.18 %	17.66 %
6	SATPUR DIVISION	23	215
	%	9.50 %	9.86 %
	TOTAL	**242**	**2180**
		(100.00)	**(100.00)**

Source: Traffic office, Nashik City (2014).

Nashik city: Division wise Distribution of Rickshaw Stops (2014)

Fig. 4.14
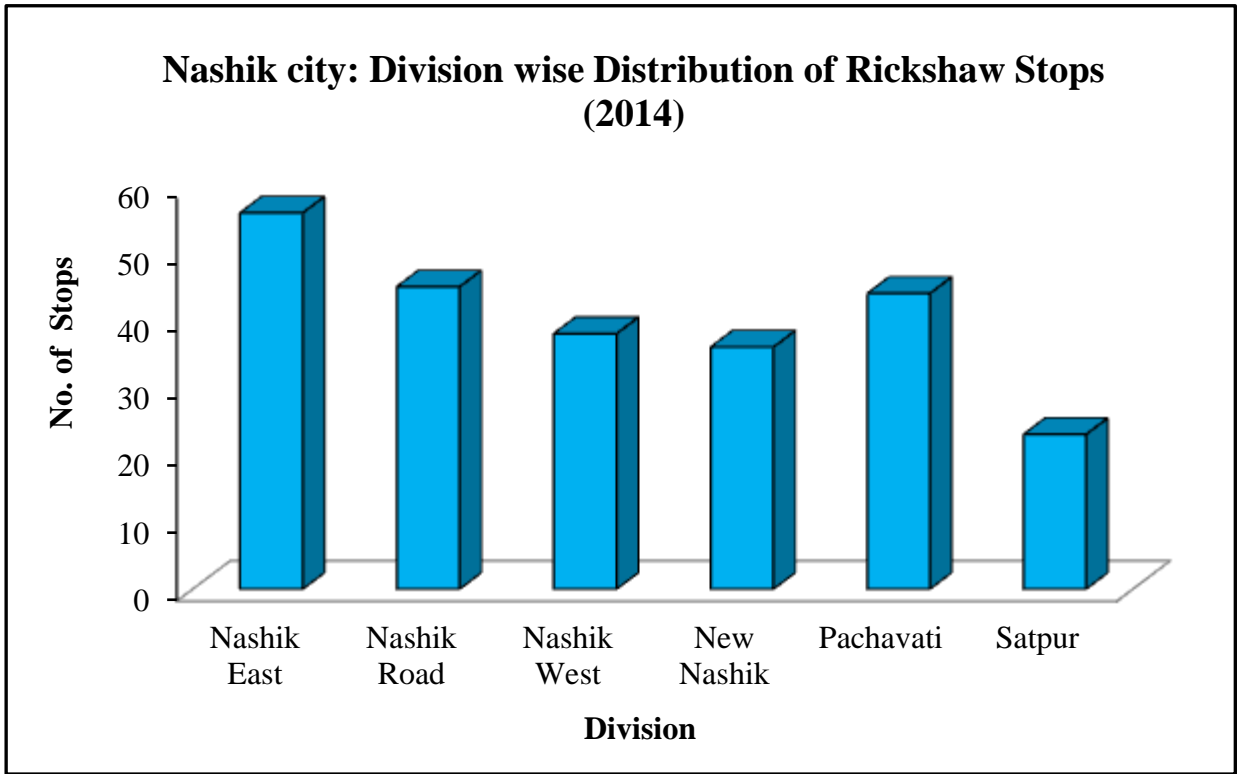
Nashik city: Division wise Distribution of Rickshaws (2014)
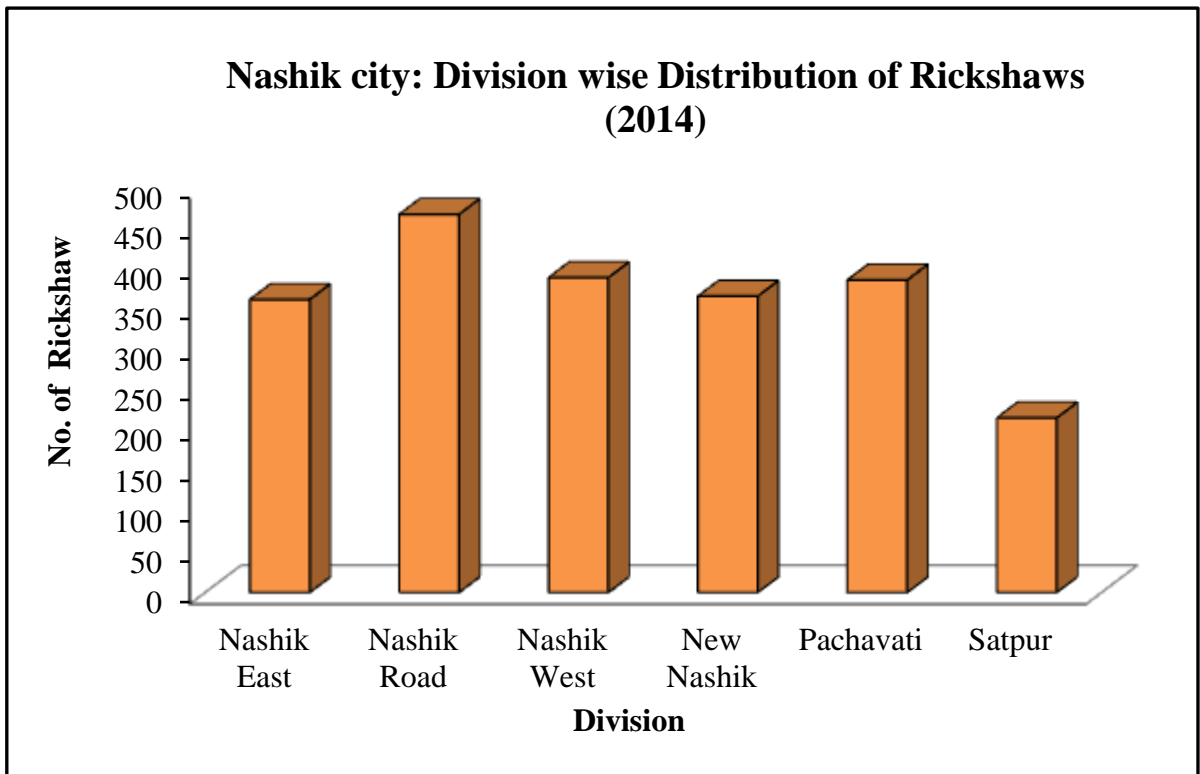
Fig. 4.15

4.19   DIVISION WISE FREQUENCY OF RICKSHAWS:-

Here, an attempt has been made to study the frequency of rickshaws from various nodes or stops. For this purpose, most accessible nodes have been considered and the data about frequency of rickshaws has been collected through field work. The number of rickshaws and their trips has been considered and tabulated.

It is observed that, the highest frequency of rickshaws has been found at C.B.S (2350) followed by Nimani bus stand (1750) and Nashik road railway station (1470). They account 25.30, 18.84, and 15.82 percent frequency of rickshaws respectively. These three divisions/nodes have its important; the C.B.S rickshaw stop is located at the old bus stand of the city. The Nimani bus stand is the second important node from which the frequency of rickshaws is higher because Nimani is the main city bus stand and most of religious places are nearby from this bus stand. The Nashik road railway station is now became a second C.B.D of the city, from which many passengers, lot of goods transport are done by two main roads, i.e. route Poona highway and jail road.

The lowest frequency of rickshaw has been observed at Satpur (13.94 percent), Pathardi phata (13.45 percent) and Mumbai naka (12.65 percent). The Table No. IV-VII, Fig. 4.16 and Fig. 4.17 gives clear idea about the frequency of rickshaws trips from various important nodes to the place of destination within study region.

NASHIK CITY: DIVISION WISE FREQUENCY OF RICKSHAWS WITH

MOST ACCESSIBLE NODES (2014)

SR. NO	DIVISION (MOST ACC. NODES)	TRIPS	
		IN.NOS	IN %
1	NASHIK EAST DIVISION (DWARKA)	1175	12.65
2	NASHIK ROAD DIVISION (BYTCO POINT)	1470	15.82
3	NASHIK WEST DIVISION (COLLEGE ROAD)	2350	25.30
4	NEW NASHIK DIVISION (PATHARDI PHATHA)	1250	13.45
5	PANCHAVATI DIVISION (NIMANI BUS STAND)	1750	18.84
6	SATPUR DIVISION (SATPUR GAON)	1295	13.94
	TOTAL	**9290**	**100.00 %**

Source: City Traffic office, Nashik (2014).
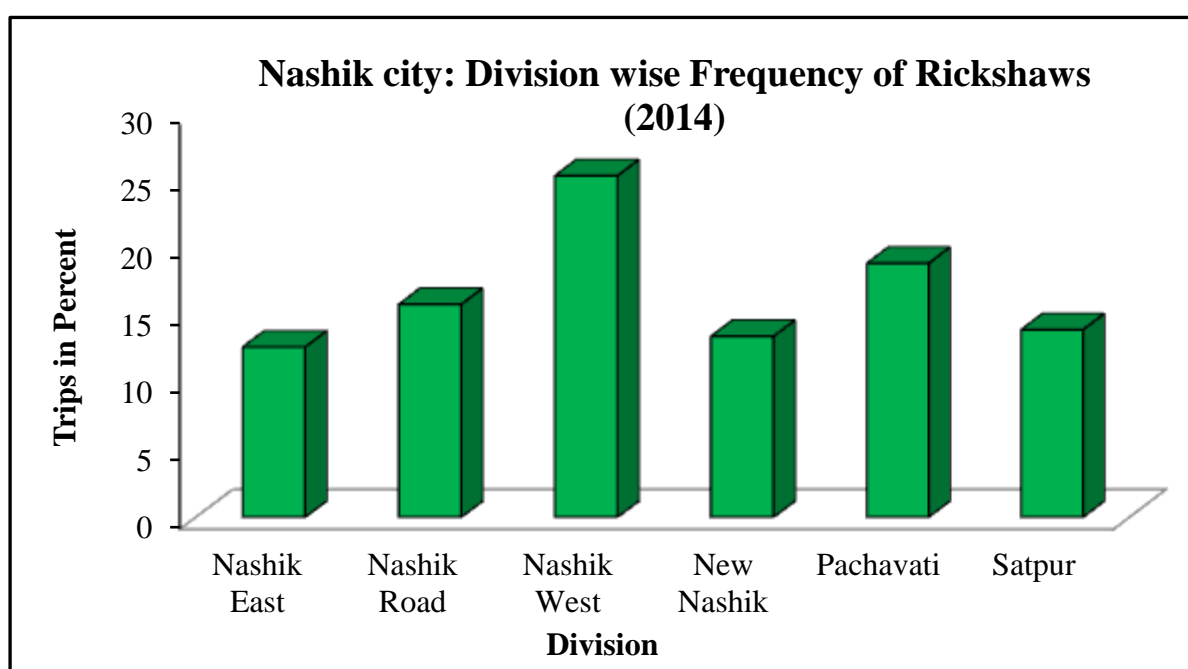
Fig. 4.16

TABLE NO.IV-VII

NASHIK CITY: INTER DIVISION WISE FREQUENCY OF RICKSHAWS

(2014)

SR. NO	DIVISION	MOST ACCESSIBLE NODE	PLACE OF DESTINATION	TRIPS
1	NASHIK EAST DIVISION	DWARKA	Nashik Road (Bytco Point)	100
			Nashik West (College Road)	400
			New Nashik (Pathardi Phata)	300
			Panchvati (Nimani Bus stand)	250
			Satpur (Satpur gaon)	125
			Total	1175
2	NASHIK ROAD DIVISION	BYTCO POINT	Nashik East (Dwarka)	100
			Nashik West (College Road)	700
			New Nashik (Pathardi phata)	100
			Panchvati (Nimani Bus stand)	500
			Satpur(Satpur gaon)	70
			Total	1470
3	NASHIK WEST DIVISION	COLLEGE ROAD	Nashik East (Dwarka)	400
			Nashik Road (Bytco point)	700
			New Nashik (Pathardi phata)	300
			Panchvati (Nimani Bus stand)	500
			Satpur(Satpur gaon)	450
			Total	2350

4	NEW NASHIK DIVISION	PATHARDI PHATHA	Nashik East (Dwarka)	300
			Nashik Road (Bytco point)	100
			Nashik West (College Road)	300
			Panchvati (Nimani Bus stand)	200
			Satpur (Satpur gaon)	350
			Total	1250
5	PANCHAVATI DIVISION	NIMANI BUS STAND	Nashik East (Dwarka)	250
			Nashik Road (Bytco point)	500
			Nashik West (College Road)	500
			New Nashik (Pathardi phata)	200
			Satpur (Satpur gaon)	300
			Total	1750
6	SATPUR DIVISION	SATPUR GAON	Nashik East (Dwarka)	125
			Nashik Road (Bytco point)	70
			Nashik West (College Road)	450
			New Nashik (Pathardi phata)	350
			Panchvati (Nimani Bus stand)	300
			Total	1295

Source: City Traffic office, Nashik (2014).

Nashik City: Inter Division Wise Frequency of Rickshaws (2014)
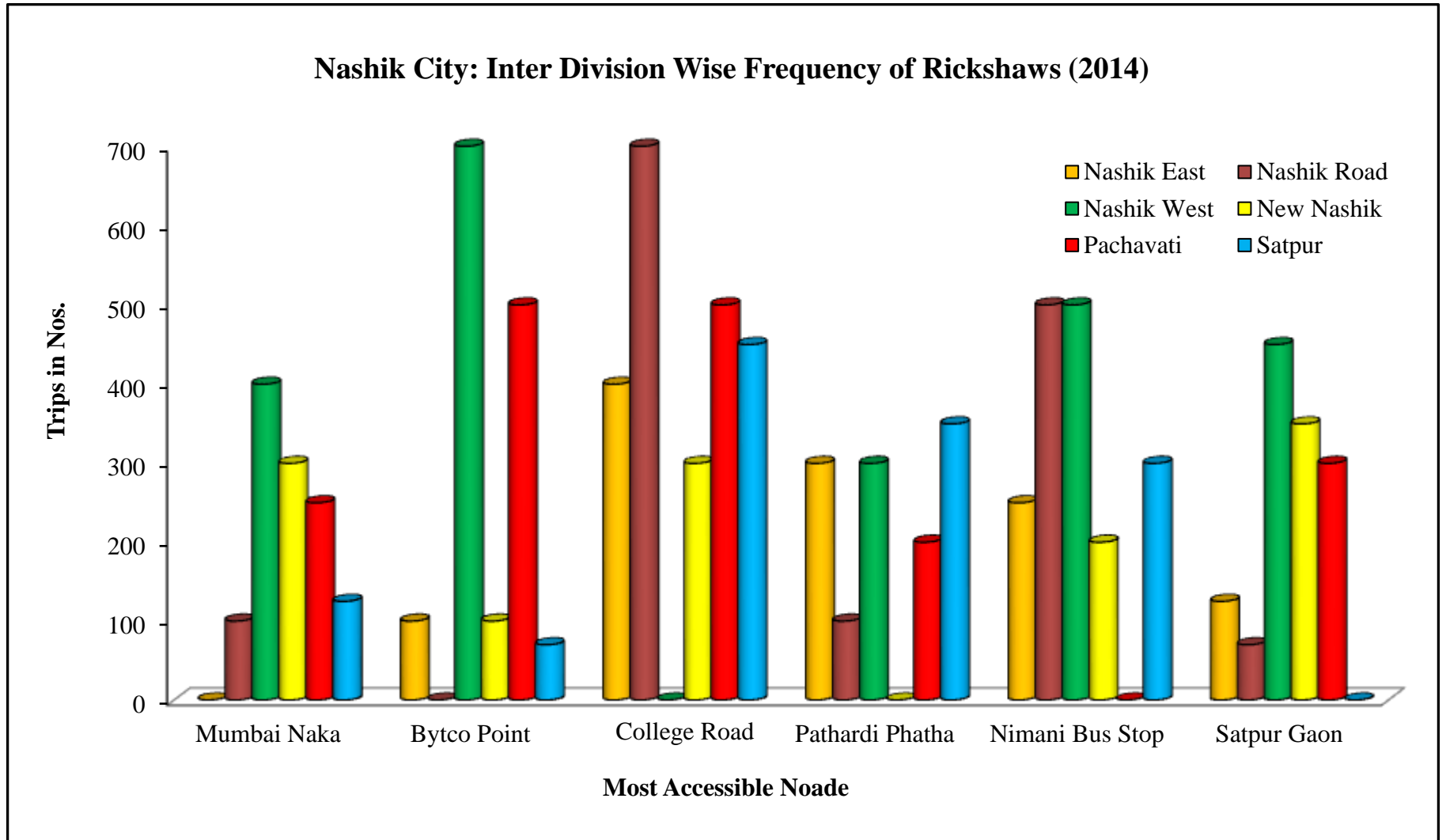
Fig. 4.17

4.20   NASHIK CITY: FREQUENCY OF BUSES:-

The frequency of buses is an important aspect of the study in intra urban transport system because the city bus links the neighborhood area and suburban areas which is newly developed. The movement of passengers through the bus has got more importance in traffic system.

(A)   Frequency of Buses from Nimani Bus Stand:-

Here, an attempt has been made to study the frequency of buses per day from nodal points, i.e. Nimani bus stand and Nashik road bus stand. The Table No. IV-VIII and Fig. 4.18 gives clear idea about the distance from Nimani bus stand and the frequency of buses per day.

It is observed, with the help of Table No. IV-VIII that, the highest frequency of Buses 155 per day is found from Nimani to Nashik Road, the second highest frequency is observed from Nimani to Kamthawade i.e. 82 Buses per day. The Deolali Camp and Ambad M.I.D.C. have same frequency of Buses i.e. 61 Buses each. The deolali gaon, Vihit gaon, Satpur gaon have same frequency of 58 Buses per day for each. Then Adgaon and Agartakali Gaon have nearly same frequency i.e. 42 and 48 respectively. Nandur Dasak, Kamthawade-Morwadi and Panchak have nearly same frequency i.e. 36, 32 and 30 Buses per day respectively. Then Mahatma Nagar and Gangapur Gaon have same frequency of 29 Buses per day. Then Satpur-Shramik Nagar have frequency of 26 Buses per day. Pimpalgaon Bahula and Pathardi Phata have nearly same frequency i.e. 24 and 21 Buses Respectively per day. Satpur-Shivaji Nagar and Satpur-Ashok Nagar have same frequency i.e. 18 Buses per day. Mhasrul Gaon and Bidikamgar Nagar have same frequency i.e. 17 Buses per day. Pathardi gaon, Makhamlabad gaon and Dasak gaon nearly have same frequency i.e. 13 and 11 Buses respectively per day. Then Anandwali, Meri Mhashrul, Panchak, Chadegaon, Chehedi, Vadner, Pimpalgaon Khamb, Dategaon, Wadala gaon, Ambad gaon, Chunchale gaon, have less than 10 frequency of Buses per day.

TABLE NO. IV-VIII

	NASHIK CITY: FREQUENCY OF BUSES FROM NIMANI BUS STAND (2014)			
SR. NO	**DESTINATION**	**DISTANCE (K.M)**	**BUSES (Numbers)**	**PERCENTAGE (%)**
1	SATPUR	7.5	57	5.56
2	SATPUR-SHIVAJI NAGAR	12	18	1.76
3	SATPUR-SHRAMIK NAGAR	13	26	2.54
4	SATPUR-ASHOK NAGAR	11	18	1.76
5	PIMPALGAON BAHULA	10.2	24	2.34
6	ANANDWALLI	6	4	0.39
7	ASARAM BAPU (ANANDWALLI)	6.3	7	0.68
8	GANGAPUR	10	29	2.83
9	MAKHAMLABAD	4.5	13	1.27
10	MHASRUL	4.5	17	1.66
11	MERI(MHASRUL)	2.5	3	0.29
12	ADGAON	8	42	4.10
13	MANUR	7	30	2.93
14	NANDUR DASAK	7	36	3.51
15	PANCHAK	11.2	7	0.68
16	DASAK	12.1	11	1.07
17	AGAR TAKALI	6	48	4.68
18	CHADEGAON	20.7	3	0.29
19	CHEHEDI	16.5	7	0.68
20	NASHIK ROAD	13	155	15.12
21	DEOLALI CAMP	18.6	58	5.66
22	DEOLALI GAON	18.6	58	5.66
23	VIHITGAON	14.5	58	5.66
24	VADNER	13.5	1	0.10
25	PIMPALGAON KHAMB	13	6	0.59
26	DADEGAON	14.4	3	0.29
27	WADALA	4	6	0.59

SR. NO	DESTINATION	DISTANCE (K.M)	BUSES (Numbers)	PERCENTAGE (%)
28	PATHARDI PHATA	14.2	21	2.05
29	PATHARDI	10	13	1.27
30	AMBAD	12	9	0.88
31	AMBAD-JADHAV SANKUL	9.9	8	0.78
32	AMBAD(MIDC)	14.7	61	5.95
33	KAMTWADE	9.3	82	8.00
34	KAMTWADE-MORWADI	7.3	32	3.12
35	CHUCHALE	12.1	8	0.78
36	MAHATMA NAGAR	6	29	2.83
37	BIDI KAMGAR NAGAR	7.3	17	1.66
	TOTAL		**1025**	**100**

Source: S.T. Depot Office, Nashik City (2014).

Nashik City : Frequency of Buses from Nimani Bus Stand (2014)
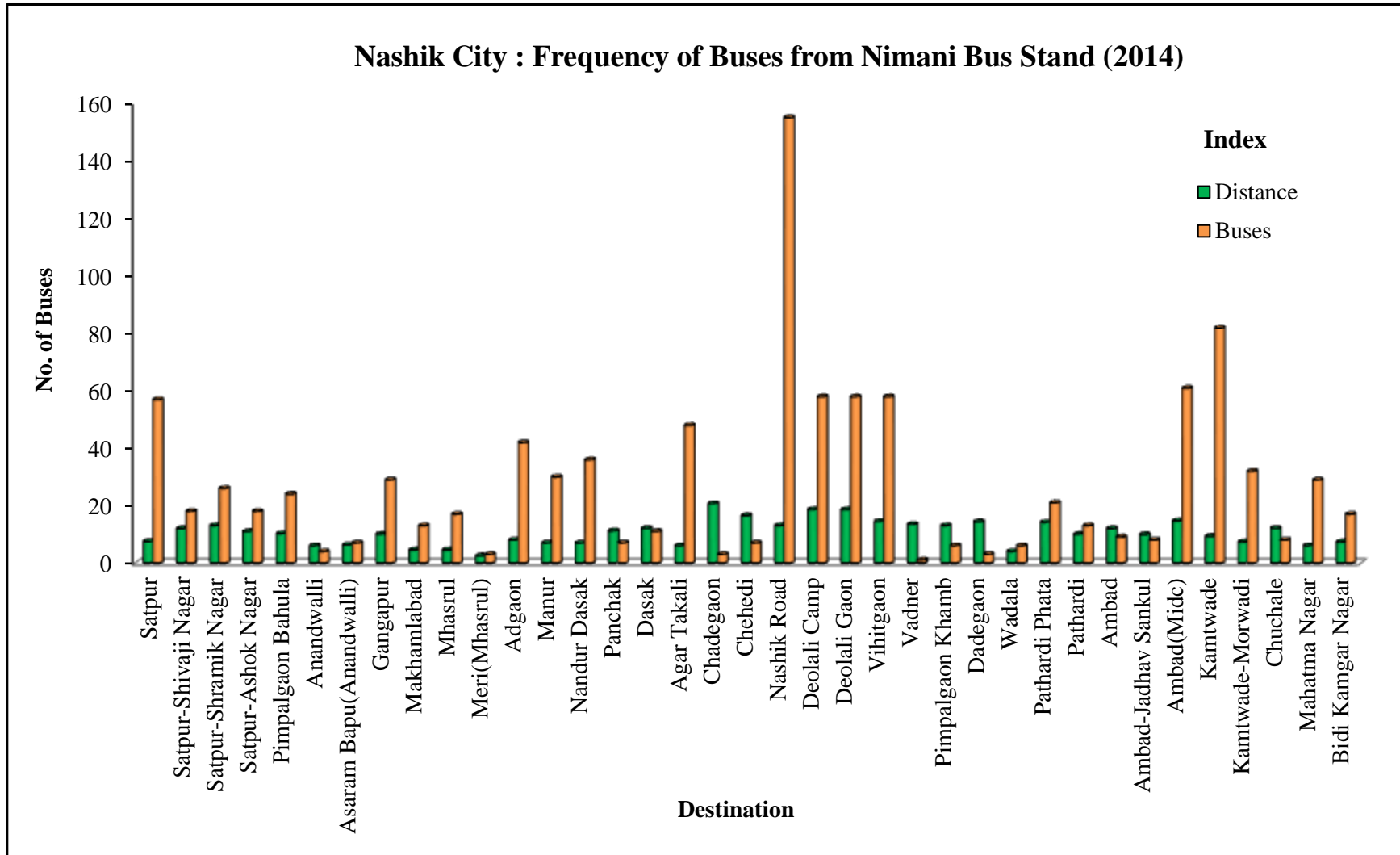
Fig.4.18

(B) **Frequency of Buses from Nashik road Bus stand:-**

The buses which run from Nimani bus stand and the Nashik road bus stand differ from each other. The places linked by Nashik road bus stand and Nimani bus stand are same but some more have been added at Nashik road bus stand. The Table No. IV-IX and Fig. 4.19 gives clear idea about the frequency of buses per day from Nashik road bus stand to other places.

It is observed, with the help of the Table No. IV-IX and Fig.4.19 that, the highest frequency of Buses per day (150 or 23.36%) is observed from Nashik Road Bus stand to Nimani Bus stand because this route covers Central bus stand of Nashik City. Most of the people travel to the main area of the city for their business relations. The Nandur Dasak, Panchak, Dasak, Adgaon, Meri-Mhashrul, Eklahara have more frequency from 33 to 28 Buses per day respectively. As shown in Table No. IV-IX, Kamthawade, Ambad gaon, Agartakali Gaon have adequate frequency i.e. 25 to 32 buses per day respectively. Then Ambad-Jadhav Sankul, Morwadi, have same frequency of Buses i.e. 20 Buses per day, Chehedi gaon, Chunchale gaon, Mahatma Nagar, Pimpalgaon Bahula, Satpur gaon, nearly have same frequency of Buses i.e. 15-13 Buses per day, Other places have frequency of Buses less than 10 Buses per day.

TABLE NO. IV-IX

NASHIK CITY: FREQUENCY OF BUSES FROM NASHIK ROAD BUS STAND (2014)			
SR. NO	DESTINATION	DISTANCE (K.M)	BUSES (Numbers)	PERCENTAGE (%)
1	SATPUR	16.5	13	2.02
2	SATPUR-SHIVAJI NAGAR	16.8	7	1.09
3	SATPUR-SHRAMIK NAGAR	17.9	9	1.40
4	SATPUR-ASHOK NAGAR	16.6	8	1.25
5	PIMPALGAON BAHULA	17.1	13	2.02
6	ANANDWALLI	15.1	5	0.78
7	ASARAM BAPU ASHRAM	14.4	5	0.78
8	GANGAPUR	18	5	0.78
9	MAKHAMLABAD	14.7	5	0.78

10	MHASRUL	15	28	4.36
11	MERI(MHASRUL)	14	28	4.36
12	ADGAON	11.2	30	4.67
13	MANUR	5.5	6	0.93
14	NANDUR DASAK	6.4	33	5.14
15	PANCHAK	5.6	30	4.67
16	DASAK	4.5	28	4.36
17	AGAR TAKALI	2.8	22	3.43
18	CHADEGAON	3.6	6	0.93
19	CHEHEDI	3.6	17	2.65
20	DEOLALI CAMP	7.4	4	0.62
21	DEOLALI GAON	1.3	4	0.62
22	VIHITGAON	1.9	4	0.62
23	VADNER	4.8	7	1.09
24	PIMPALGAON KHAMB	7.8	3	0.47
25	DADEGAON	8.5	3	0.47
26	WADALA	7.2	2	0.31
27	PATHARDI PHATA	10.7	3	0.47
28	PATHARDI	10.2	3	0.47
29	AMBAD	14.1	24	3.74
30	AMBAD-JADHAV SANKUL	13.1	20	3.12
31	AMBAD(MIDC)	12.1	9	1.40
32	KAMTWADE	14.9	25	3.89
33	KAMTWADE-MORWADI	12.1	20	3.12
34	CHUCHALE	17.5	15	2.34
35	MAHATMA NAGAR	12.7	14	2.18
36	BIDI KAMGAR NAGAR	14.4	6	0.93
37	EKLAHARA	7.8	28	4.36
38	NIMANI BUS STAND	13	150	23.36
	TOTAL	**502.6**	**642**	**100**

Source:- S.T. Depot Office, Nashik City (2014)

Nashik city : Frequency of Buses from Nashik road Bus stand (2014)
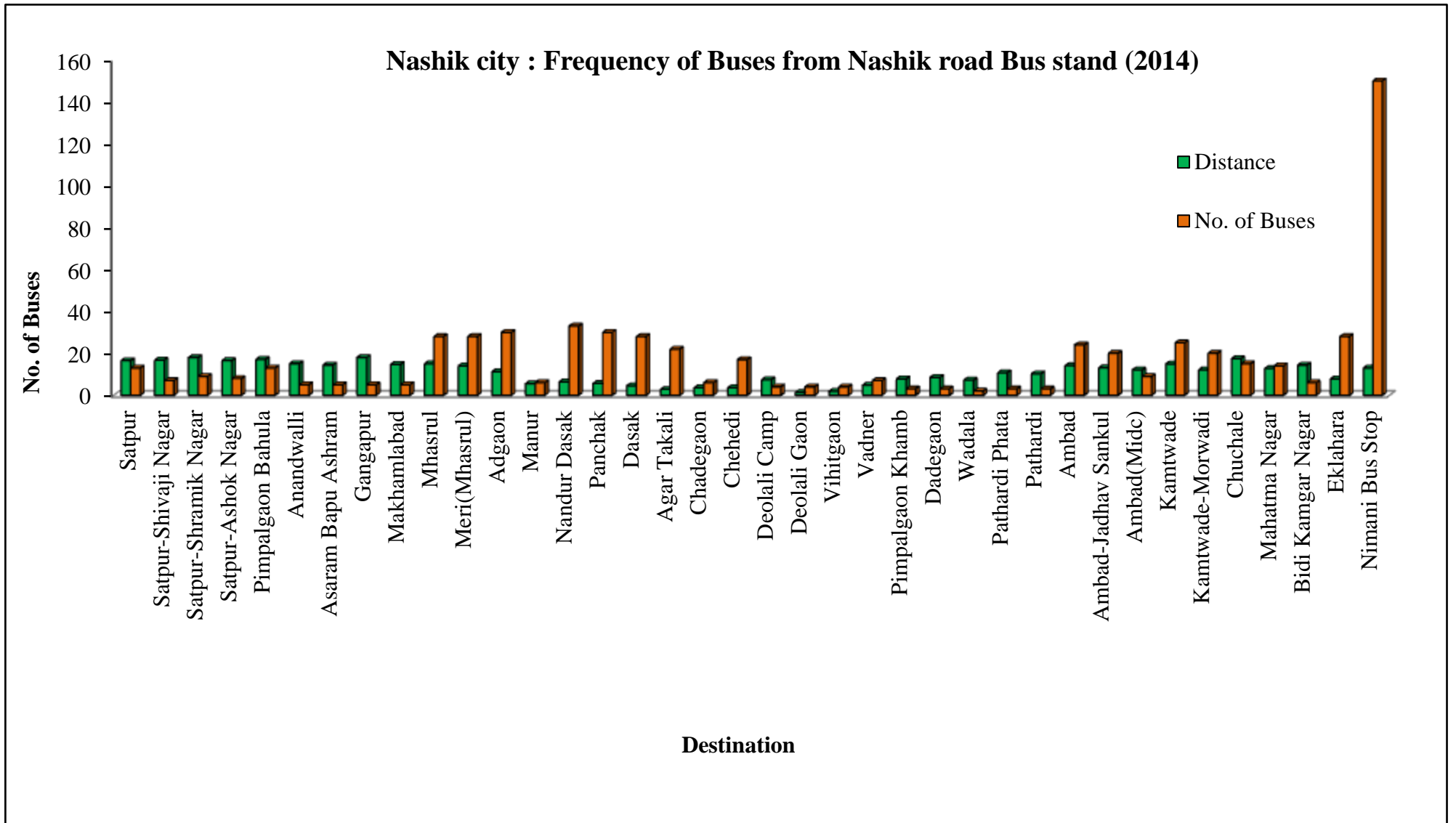
Fig.4.19

4.21   STRUCTURAL ANALYSIS OF TRANSPORTATION
      NETWORK:-

For the study of transport geography, the structural analysis of transportation network is more important.

In the developed country of the world the Road network, Rail Network and Air Network develops parallel. This development plays an important key role for the economic development of the city. In the other words, development of transport network is directly proportional to the economic development of that city (Robinson and Boxford, 1978).

To derive transport network in the mathematical format, Garrison and Kansky use various index number to derive it from graph theory in which network is considered as a structure with various points (said as a vertices (V) and there links (said as a Edges (E)) this vertices and edges with their inter connectivity prove the connectivity within that network. It may be more accessible or least accessible depend of degree of connectivity. This degree of connectivity directly related to economic growth of that network area. (Garrison, 1960, Kansky, 1963).

STRUCTURAL ANALYSIS OF ROAD NETWORK:-

For Structural Analysis of Road Network, the following methodology has been used which is derived by Robinson and Boxford (1978)

    I)   The connectivity of network.

    II)   Centrality within a network.

    III)   The spread and diameter of network.

    IV)   Detours.

I)   **The Connectivity of the Networks:-**

It is defined with the various links which has been established between nodes. If more arcs are present in any transportation network, it indicates various links within the nodes of network. If this degree of connectivity is more than the transport network, there is more efficiency. So it is essential for the geographer to study the degree of connectivity within the study area.

This type of study is explained and derived properly by the American scientist named as K. J. Kansky. He explained various indexes which are given below.

A) The Cyclomatic Number:-

The cyclomatic number is based upon the condition that as soon as a connected network has enough arcs or links to form a tree then any additional arcs will result in the formation of circuits. Thus the number of circuits in a connected network equals the total number of arcs minus the number of arcs required to form a tree, i.e. one less the nodes or vertices. Hence the cyclomatic number may be formulated thus:

Cyclomatic number = a (n-1)

Where,

a =   Equals the number of arcs

n =   The number of nodes

Thus the cyclomatic number may be found by subtracting one. This formula applies to a connected graph, where there are two or more sub graphs then the formula for the cyclomatic number is:-

a = n+x

Where,

x=Equals the number of sub graphs

The above formula can write as:

Cyclomatic number = e – v+p

Where,

e =   Total number of edges

v =   Total number of vertices

p =   Total number of non- connected sub graphs

The cyclomatic number is of little value in distinguishing between networks possessing low levels of connectivity, but where networks are of more complex nature, the cyclomatic number tells how many fundamental circuits are present in the transport network.

B) The Alpha index:-

One of the most useful and perhaps the best measures of the connectivity of a network, particularly a fairly complex network, is the alpha index. This consists of ratio of the number of fundamental circuits to the maximum possible number of circuits which may exist in a network. The alpha index is expressed alternatively in the form of a fraction as:

$$x = \frac{e - v + p \text{ x } 100}{2v\text{-}5}$$

If the index is multiplied by 100 this will convert it into a percentage, thereby giving the number of fundamental circuits as a percentage of the maximum number possible. The alpha index gives the range values possible: from 0 to 100 per cent. The higher the index, the greater is the degree of connectivity in the network.

A value of or 100 per cent, is indicative of a highly integrated network in which every possible link exists between the various nodes. A network with an alpha value index value of 1 implies that a network has the highest possible number of arcs and fundamental circuits and hence possesses the maximum degree of connectivity.

C) **The beta index:-**

The beta (B) index is a very simple measure of connectivity of networks which can be found by dividing the total number of arcs in a network by the total number of nodes.

Formula:

$$B = \frac{\text{Arcs /Edges}}{\text{Nodes/Vertices}}$$

In a simple formula:

B = e/v

Where,

e = Total no. of edges

v = Total no. of vertices

The beta index ranges from 0.0 for networks which consist just of nodes with no arcs. Through 1.0 and greater where networks are well connected. Very simple networks and trees possess values less than 1.0 a connected network involving a single circuit has a value of 1.0 while networks of greater complexity, which include several circuits, have value higher 1.0 the beta index is of less value for complex networks than for simple ones; in fact its chief value is in distinguishing very simple networks where no circuits are involved.

D) **The gamma index:**

The gamma index describes in numerical terms the connectivity of networks. The gamma index is derived from the following formula:

Y = arcs/3(nodes-2)

In a simple formula as:

$$Y = e/3(v-2) \times 100$$

For a completely connected network, the index always lies between 0.00 and 1.00 or 1.00 to 100.

II)   Centrality within a network :-

D. Konig (1936) developed an index called konig number to describe the centrality of any node in a network. Konig number for each node is calculated by adding up the number of arcs from each other nodes, using the shortest path available.

III)   The spread and diameter of networks:-

Kansky (1963) has developed two useful indices to measure the spread of networks. The diameter is obtained by counting number of arcs on the shortest possible path between the two nodes lying farthest apart on the network. The details of the two indices are as below:-

A)   pi (n) index   = $\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$

A similar index to kansky's (n) ratio is his ETA (n) index which is also indicative of the spread of a network. Because the numerator is measured in kilometers, therefore, the ratio is not scale free but represents the average length of an edge of the network. This index is useful in examining the utility of a given transport network. The ETA index is given by the formula:

η= M/E

Where M = total network length in km and E = the observed number of edges

B)   ETA index (n) = $\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (Arcs)}}$

IV)   Detour Index :-

Direct routes, i.e. perfectly straight routes, between two places are known as 'desire line', this is because travelers would normally wish to travel by means of the most direct routes which equate with shortest possible distances. Perfectly straight routes are, however, seldom to found in reality even the most direct route in practice deviates from the straight line: this is to be seen in motorways, which usually provide the most direct road link, because of slight bends in the roadway. The deflection of routes from direct paths resulting from topography or other physical obstacles is a common geographical phenomenon. Such deviations can be measured by the detour index, the details below:

Detour index = actual route distance/ straight line distance x100

In other words, the detour index is the actual journey distance calculated as a percentage of the desire line distance. It will be clear that as the actual route distance is almost always longer than the desire line distance, than the detour index will be greater, in almost all cases, than 100 and in the nature of things can never be less than 100. Again, it will be fairly obvious that the lower the detour index, the more direct is a given route.

The detour index is of value in, for example assessing the effects which the addition or subtraction of links produce in a given network or for assessing the degree of change resulting from the introduction of new means of transport.

An example of the former is provided by the rationalization of the railways: the closure of certain links has meant an increase in the detour index in many instances between two places. An example of the later is given in the case where motor way construction has superseded country roads in hilly areas, for the alignment and inclination of the motorway will lessen the effect of the relief barrier on communications.

THE ACCESSIBILITY:-

The accessibility is the most significant index of measuring the structure of transport networks. It is a useful indicator of socio-economic development of a region.

One of the most important attributes of a transportation network relates to accessibility, and as a geographer is particularly concerned with accessibility as a locational feature. Earlier geographers primarily concerned with various techniques which have been designed to measure the degree of completeness of links between nodes in a network. In some cases, as in many rural areas, there is a network. In some cases, as in many rural areas, there is only a low level of connectivity between the various nodes, conversely, in densely populated, highly industrialized areas, there is usually a high level of connectivity between the various nodes in a network. Therefore, the degrees can be measured into different ways within the network.

Accessibility can be measured topologically in three different ways:

A) **Shortest- Path Matrix**:- By the shortest- path matrix-the number of arcs used in the shortest path between all possible pairs of nodes,

B) **Associated Number**:- By the associated number-the number of arcs needed to connect a node to the most distant node from it, and

C) **Shimbel Index :-** By the shimbel index, derived from the shortest-path-matrix, which indicates the minimum number of arcs needed to connect any node with all the other nodes in the networks by the shortest path.

4.21.1 STRUCTURAL ANALYSIS OF ROAD NETWORK IN PANCHAVATI DIVISION

A) **The Cyclomatic Number:-**

$e =$ Total number of edges (16)

$v =$ Total number of vertices (14)

$p =$ Total number of non- connected sub graphs (1)

For the study division, the cyclomatic number is calculates as

$$\text{Cyclomatic number} = e - v + p$$
$$= 16 - 14 + 1$$
$$= 3$$

Fig 4.20 shows 3 fundamental circuits which are present in the Panchavati Division transport network.

B) **The Alpha index:-**

For the study division the alpha index is calculated with the help of following formula:

$$\text{Alpha index} = e - v + p /2v - 5 \times 100$$
$$= 16 - 14 + 1/2(14) - 5 \times 100$$
$$= 3/23 \times 100$$
$$= 13.0\%$$

In the study division the alpha index shows low degree of connectivity (Fig.4.20)

C) **The beta index:-**

The beta for the study division has been calculated as follows:

$$B = \frac{e}{v}$$
$$B = \frac{16}{14}$$
$$B = 1.14$$

For the study division, the beta index is 1.14; it means that the region is quite well connected by road network (Fig. 4.20).

D) **The gamma index:**

The gamma index for the study division is calculated as follows:

$$Y = e/3 \, (v\text{-}2) \times 100$$
$$Y = 16/3(14\text{-}2) \times 100$$
$$Y = 5.3/12 \times 100$$
$$Y = 44.44\%$$

It is observed that the study division is quite well connected by road network (Fig. 4.20)

II)   Centrality within a network :-

In the study division, the Nimani bus stand is the most central nodes (Fig. 4.20)

III)   The spread and diameter of networks:-

For the study division the pi (n) index is as follow:

A)   pi (n) index   =   Total distance of network
                                                    Distance of diameter

Pi (n) index   =   35.65km
                                    11 km

Pi index   =   3.24

B)   ETA index (n)   =   Total network distance (km)
                                                    Number of Edges (Arcs)

ETA index   =   35.65 km
                                    16

ETA   =   2.22km / Nos.

V)   Detour Index :-

Here, an attempt has been made to calculate the detour index for following routes:

A)   Makhamlabad naka to R.T.O

Detour index   = 3.7/2.5x100

= 148

B)   Makhamlabad naka to Kalaram Mandir

Detour index   = 1.42/0.85x100

= 167.05

C)   Hirawadi to Mhasrul

Detour index   = 6.16/3.25x100

= 189.53

D)   Meri-mhasrul to Hirawadi

Detour index   = 3.34/1.20x100

= 278.33

SUMMARY TABLE

NASHIK CITY : STRUCTURAL ANALYSIS OF ROAD NETWORK IN PANCHAVATI DIVISION

INDEX	FORMULA	VALUE	LIMIT VALUE	REMARK
Cyclomatic No.	e – v + p	3	Min. 5 Circuits	Low connectivity
Alpha Index	e – v + p/2v – 5 x 100	13.0%	0% to 100% Low to High	Low degree connectivity
Beta Index	$B = \dfrac{e}{v}$	1.14	Less than 1 = Low 1 = Quite well More than 1 = High	High connectivity
Gamma Index	e/3(v-2)x 100	44.44%	0% to 35% = Low 35% to 70% = Quite well 70% to 100% = High	Quite well connectivity
PI Index	$\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$	3.24	Less than 2 = Low More than 2 = High	High connectivity
ETA Index	$\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (Arcs)}}$	2.22 km/nos.	Less than 5 = High More than 5 = Low	High connectivity
Detour Index	Actual route distance/straight line distance X 100	If value more than 100 then observed relief barrier		Makhamalabad (D) to RTO (N) = 148% Meri (M) to Hirawadi (L) = 278.00%

From the above calculations, It is observed that the detour is found more than 100.00, it means these places have affected by relief barriers, the route of Makhamlabad naka to R.T.O has less detour index i.e. 148.00 so it has less effect of relief barrier but the route Meri-Mhasrul to Hirawadi has more detour index i.e.278.33 so it has more effect of relief barriers.

THE ACCESSIBILITY:-

In the present study, the accessibility of the road network has been analyzed with the help of above mentioned methods. The important nodes have been shown in the Fig.4.20 and 4.21.1 (A), 4.21.1 (B) shown matrix of the nodes by different methods.

Accessibility

A)   By shortest path matrix:-

ROWS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
A	0	1	2	3	2	3	2	2	1	1	2	1	1	2	**23**
B	1	0	1	2	2	3	3	3	2	1	1	2	2	1	**24**
C	2	1	0	1	2	3	4	3	2	1	1	2	3	2	**27**
D	3	2	1	0	1	2	3	4	3	3	2	4	2	1	**31**
E	2	2	2	1	0	1	2	4	3	2	4	3	1	1	**28**
F	3	3	3	2	1	0	1	2	3	4	4	4	2	2	**34**
G	2	3	4	3	2	1	0	1	2	4	5	3	3	3	**36**
H	2	3	3	4	4	2	1	0	1	3	4	2	3	4	**36**
I	1	2	2	3	3	3	2	1	0	2	3	1	2	3	**28**
J	1	1	1	3	2	4	4	3	2	0	1	2	2	2	**28**
K	2	1	1	2	4	4	5	4	3	1	0	2	2	2	**33**
L	1	2	2	4	3	4	3	2	1	2	2	0	2	3	**31**
M	1	2	3	2	1	2	3	3	2	2	2	2	0	2	**27**
N	2	1	2	1	1	2	3	4	3	2	2	3	2	0	**28**

Matrix – 4.21.1 (A)

B) By the shimbel index and associated number:-

ROWS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Associated Number	Shimbel index
A	0	1	2	3	2	3	2	2	1	1	2	1	1	2	**3**	**23**
B	1	0	1	2	2	3	3	3	2	1	1	2	2	1	**3**	**24**
C	2	1	0	1	2	3	4	3	2	1	1	2	3	2	**4**	**27**
D	3	2	1	0	1	2	3	4	3	3	2	4	2	1	**4**	**31**
E	2	2	2	1	0	1	2	4	3	2	4	3	1	1	**4**	**28**
F	3	3	3	2	1	0	1	2	3	4	4	4	2	2	**4**	**34**
G	2	3	4	3	2	1	0	1	2	4	5	3	3	3	**5**	**36**
H	2	3	3	4	4	2	1	0	1	3	4	2	3	4	**4**	**36**
I	1	2	2	3	3	3	2	1	0	2	3	1	2	3	**3**	**28**
J	1	1	1	3	2	4	4	3	2	0	1	2	2	2	**4**	**28**
K	2	1	1	2	4	4	5	4	3	1	0	2	2	2	**5**	**33**
L	1	2	2	4	3	4	3	2	1	2	2	0	2	3	**4**	**31**
M	1	2	3	2	1	2	3	3	2	2	2	2	0	2	**3**	**27**
N	2	1	2	1	1	2	3	4	3	2	2	3	2	0	**4**	**28**

Matrix – 4.21.1 (B)

Nodes: Total 14

A	-	Nimani bus stand	H	-	K.K.W
B	-	Peth road	I	-	Adgaon naka
C	-	Makhamlabad naka	J	-	Kalaram mandir
D	-	Makhamlabad	K	-	Ramkund
E	-	Mhasrul	L	-	Hirawadi
F	-	Adgaon	M	-	Meri-Mhasrul
G	-	Amrutdham	N	-	R.T.O.

Accessibility

1	Most Accessible	-	Nimani bus stand (A),
2	More Accessible	-	Peth road (B), Makhamlabad Naka (C), Meri Mhasrul (M).
3	Moderate Accessible	-	Mhasrul (E), Adgaon naka (I),

			Kalaram mandir (J), R.T.O.(N).
4	Low Accessible	-	Makhamlabad (D), Adgaon (F), Amrutdham (G), K.K.W (H), Ramkund(K), Hirawadi (L).

From Panchavati Division summary table, Matrix- 4.21.1 (A) and Matrix-4.21.1 (B) it has been observed that, Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 3 for Panchavati division. Higher the Alpha index shows greater degree of connectivity within the network but for Panchavati division it has observed only 13% which show low degree of connectivity. For the study division the Beta index is 1.14; it means that the Panchavati division has high connected by road network. Gamma index describes connectivity of networks in percent which has observed 44.44% which show quite well connectivity. If value of pi index is more than 2 then given road network is well connected, for Panchavati division it has observed 3.24, which shows high connectivity but E.T.A. index observed 2.22 km / Nos., which has shown high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers, the route Makhamlabad Naka to R.T.O has less detour index i.e. 148.00 so it has less effect of relief barrier but the route Meri-Mhasrul to Hirawadi has more detour index i.e.278.33 so it has more effect of relief barriers. The Shimbel index can be derived from the shortest-path matrix in the study division. The Nimani bus stand has lowest Shimbel index, and the associated number is 3, so it is most accessible node than the other nodes. The highest associated number 5 has observed for Amrutdham and Ramkund where accessibility has found low. For the Panchavati division the mean associated number is 54/14=3.85.

Structure of Road Network Nashik City and Panchvati Division

Legend
- ◆ Accessibile Node
- Accessibile Roads
- Roads

Alphabate	Node
A	Nimani
B	Peth Road
C	Makhmalabadnaka
D	Makhmalabad
E	Mhasrul
F	Adgaon
G	Amrutdham
H	K K Wagh
I	Adgaon Naka
J	Kalaram Mandir
K	Ramkund
L	Hirawadi
M	Meri-Mhasrul
N	RTO

Fig. 4.20

4.21.2 STRUCTURAL ANALYSIS OF ROAD NETWORK IN NEW NASHIK DIVISION:-

A) The Cyclomatic Number:-

e =   Total number of edges (22)

v =   Total number of vertices (15)

p =   Total number of non- connected sub graphs (1)

For the study division, the cyclomatic number is calculates as

$$\text{Cyclomatic number} = e - v + p$$
$$= 22 - 15 + 1$$
$$= 8$$

Fig 4.21 shows 8 fundamental circuits which are present in the New Nashik Division transport network

B) The Alpha index:-

For the study division the alpha index is calculated with the help of following formula:

$$\text{Alpha index} = e - v + p / 2v\text{-}5\text{x}100$$
$$= 22\text{-}15 + 1/2(15)\text{-}5 \ X \ 100$$
$$= 8/25\text{X}100$$
$$= 32\%$$

In the study division the alpha index shows low degree of connectivity (Fig.4.21)

C) The beta index:-

The beta for the study division has been calculated as follows:

$$B = \frac{e}{v}$$

$$B = \frac{22}{15}$$

$$B = 1.47$$

For the study division, the beta index is 1.47; it means that the region is highly connected by road network (Fig.4.21)

D) The gamma index:

The gamma index for the study division is calculated as follows:

$$Y = e/3 \ (v\text{-}2) \ x \ 100$$
$$Y = 22/3(15\text{-}2) \ x100$$
$$Y = 22/39x100$$

84

Y = 56.41%

It is observed that the study division is quite well connected by road network (Fig.4.21)

II) Centrality within a network:-

In the study division, the Pathardi Phata is the most central nodes (Fig.4.21)

III)   The spread and diameter of networks:-

For the study division the pi (n) index is as follow:

A)   ETA index (n)   = $\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (arcs)}}$

ETA index   = $\dfrac{33.3\text{km}}{22}$

ETA   =   1.51km / Nos.

B)   pi (n) index   = $\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$

pi (n) index = $\dfrac{33.3\text{km}}{8.3\text{km}}$

Pi index   =   4.01

IV)   Detour Index :-

Here, an attempt has been made to calculate the detour index for following routes:

A   Grware *chowk* to Dadegaon

Detour index   = 7.2/4.5x100

= 160

B   Grware *chowk* to Pathardi gaon

Detour index   = 5.1/3.1x100

= 164.52

C   Uttam Nagar to Shivaji *chowk*

Detour index   = 2.2/1.9x100

= 115.79

D   Vadner to Ranapratap *chowk*

Detour index   = 9.6/4.6x100

= 208.69

SUMMARY TABLE

NASHIK CITY: STRUCTURAL ANALYSIS OF ROAD NETWORK IN NEW NASHIK DIVISION

INDEX	FORMULA	VALUE	LIMIT VALUE	REMARK
Cyclomatic No.	e-v+p	8	Min. 5 Circuits	High connectivity
Alpha Index	e-v+p/2v-5x100	32%	0% to 100% Low to High	Low degree connectivity
Beta Index	$B = \dfrac{e}{v}$	1.47	Less than 1 = Low 1 = Quite well More than 1 = High	High connectivity
Gamma Index	e/3(v-2)x 100	56.61%	0% to 35% = Low 35% to 70% = Quite well 70% to 100% = High	Quite well connectivity
PI Index	$\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$	4.01	Less than 2 = Low More than 2 = High	High connectivity
ETA Index	$\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (Arcs)}}$	1.51 km/nos.	Less than 5 = High More than 5 = Low	High connectivity
Detour Index	Actual route distance/straight line distance X 100	If value more than 100 then observed relief barrier		Uttam Nagar (O) to Shivaji *Chowk* (M) = 115.79% Garware *Chowk* (D) to Pathardi gaon (F) = 208.69%

From the above calculations, It is observed that the detour is found more than 100.00, it means these places have affected by relief barriers, the route of Uttam Nagar to Shivaji *chowk* has less detour index i.e. 115.79 so it has less effect of relief barrier but the route Vadner to Ranapratap *chowk* has more detour index i.e.208.69 so it has more effect of relief barriers.

THE ACCESSIBILITY:-

In the present study, the accessibility of the road network has been analyzed with the help of above mentioned methods. The important nodes have been shown in the Fig.4.21 the 4.21.2 (A) and 4.21.2 (B)   shown matrix of the nodes by different methods.

Accessibility

A) By shortest path matrix:-

ROWS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	TOTAL
A	0	1	1	2	3	4	5	6	5	3	5	4	4	3	2	**48**
B	1	0	2	1	2	3	4	4	4	2	4	3	3	2	1	**36**
C	1	2	0	1	1	2	3	3	3	3	4	3	4	2	1	**33**
D	2	1	1	0	1	2	3	3	3	3	4	3	4	2	2	**34**
E	3	2	1	1	0	1	2	2	2	2	3	2	3	1	1	**26**
F	4	3	2	2	1	0	1	1	1	3	2	1	4	2	2	**29**
G	5	4	3	3	2	1	0	1	2	4	3	2	4	3	3	**40**
H	6	4	3	3	2	1	1	0	1	4	3	2	5	3	3	**41**
I	5	4	3	3	2	1	2	1	0	4	3	2	5	3	3	**41**
J	3	2	3	3	2	3	4	4	4	0	2	2	1	1	1	**35**
K	5	4	4	4	3	2	3	3	3	2	0	1	1	2	3	**40**
L	4	3	3	3	2	1	2	2	2	2	1	0	1	1	2	**29**
M	4	3	4	4	3	4	4	5	5	1	1	1	0	2	2	**43**
N	3	2	2	2	1	2	3	3	3	1	2	1	2	0	1	**28**
O	2	1	1	2	1	2	3	3	3	1	3	2	2	1	0	**27**

Matrix – 4.21.2 (A)

B) By the shimbel index and associated number:-

ROWS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Associated Number	Shimbel index
A	0	1	1	2	3	4	5	6	5	3	5	4	4	3	2	**6**	**48**
B	1	0	2	1	2	3	4	4	4	2	4	3	3	2	1	**4**	**36**
C	1	2	0	1	1	2	3	3	3	3	4	3	4	2	1	**4**	**33**
D	2	1	1	0	1	2	3	3	3	3	4	3	4	2	2	**4**	**34**
E	3	2	1	1	0	1	2	2	2	2	3	2	3	1	1	**3**	**26**
F	4	3	2	2	1	0	1	1	1	3	2	1	4	2	2	**4**	**29**
G	5	4	3	3	2	1	0	1	2	4	3	2	4	3	3	**5**	**40**
H	6	4	3	3	2	1	1	0	1	4	3	2	5	3	3	**6**	**41**
I	5	4	3	3	2	1	2	1	0	4	3	2	5	3	3	**5**	**41**
J	3	2	3	3	2	3	4	4	4	0	2	2	1	1	1	**4**	**35**
K	5	4	4	4	3	2	3	3	3	2	0	1	1	2	3	**5**	**40**
L	4	3	3	3	2	1	2	2	2	2	1	0	1	1	2	**4**	**29**
M	4	3	4	4	3	4	4	5	5	1	1	1	0	2	2	**5**	**43**
N	3	2	2	2	1	2	3	3	3	1	2	1	2	0	1	**3**	**28**
O	2	1	1	2	1	2	3	3	3	1	3	2	2	1	0	**3**	**27**

Matrix – 4.21.2(B)

Nodes: Total 15

A	-	Trimurti *chowk*	I	-	Vadner
B	-	Pawan Nagar	J	-	Ranapratap *chowk*
C	-	Ambad gaon	K	-	Govind Nagar
D	-	Grware *chowk*	L	-	Lekha Nagar
E	-	Pathardi phata	M	-	Shivaji *chowk*
F	-	Pathardi gaon	N	-	Rane Nagar
G	-	Dadegaon	O	-	Uttam Nagar
H	-	Pimpalgaon khamb			

Accessibility

1	Most Accessible	-	Pathardi phata (E),
2	More Accessible	-	Pathardi gaon (F),
			LekhaNagar (L),
			Rane Nagar (N),
			Uttam Nagar (O),
3	Moderate Accessible	-	Pawan Nagar (B),
			Ambad gaon (C),
			Grware *chowk* (D),
			Ranapratap *chowk* (J).
4	Low Accessible	-	Trimurti *chowk* (A),
			Dadegaon (G),
			Pimpalgaon khamb (H),
			Vadner (I), Govind Nagar (K),
			Shivaji *chowk* (M),

From New Nashik Division summary table, Matrix- 4.21.2 (A) and Matrix-4.21.2 (B) it has been observed that, Cyclomatic numbers, which tell about present of fundamental circuit of a given transportation, network which has observed 8 for New Nashik division. Higher the Alpha index shows greater degree of connectivity within the network but New Nashik division it has observed only 32%, which show low degree of connectivity. For the study division the Beta index is 1.47; it means that the New Nashik division has highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 56.41 % which show quite well connectivity. If value of pi index more than 2 then given road network is well connected, for New Nashik division it has observed 4.01 which show high connectivity, also E.T.A. index observed 1.51 km / Nos. which has shown high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers. The route Uttam Nagar to Shivaji *Chowk* has less detour index i.e. 115.79 so it has less effect of relief barrier but the route Vadner to Ranapratap *chowk* has more detour index i.e.208.69 so it has more effect of relief barriers. The Shimbel index can be derived from the shortest-path matrix in the study region. The Pathardi Phata has lowest Shimbel index, and the associated number is 3, so it is most accessible node than the other nodes. The highest associated number 6 has observed for Trimurti *chowk*,

Pimpalgaon Khamb where accessibility has found low. For the New Nashik division the mean associated number is 65/15=4.33.

Fig. 4.21

4.21.3 STRUCTURAL ANALYSIS OF ROAD NETWORK IN NASHIK WEST DIVISION:-

A) The Cyclomatic Number:-

    e =   Total number of edges (18)

    v =   Total number of vertices (10)

    p =   Total number of non- connected sub graphs (2)

For the study division, the cyclomatic number is calculates as

$$\text{Cyclomatic number} = e - v + p$$
$$= 18\text{-}10\text{+}2$$
$$= 10$$

Fig 4.22 shows 10 fundamental circuits which are present in the Nashik West Division transport network

B) The Alpha index:-

For the study division the alpha index is calculated with the help of following formula:

$$\text{Alpha index} = e - v + p / 2v\text{-}5 \times 100$$
$$= 18\text{-}10\text{+}2/2 \times 10\text{-}5 \times 100$$
$$= 9/15 \times 100$$
$$= 66.66\%$$

In the study division the alpha index shows quite well degree of connectivity (Fig. 4.22)

C) The beta index:-

The beta for the study division has been calculated as follows:

$$B = \frac{e}{v}$$
$$B = \frac{18}{10}$$
$$B = 1.8$$

For the study division, the beta index is 1.8; it means that the division is highly connected by road network (Fig. 4.22)

D) The gamma index:

The gamma index for the study division is calculated as follows:

$$Y = e/3\,(v\text{-}2) \times 100$$
$$Y = 18/3(10\text{-}2) \times 100$$

$$Y = 18/24 \times 100$$

$$Y = 75\%$$

It is observed that the study division is highly connected by road network (Fig.4.22)

II)   Centrality within a network:-

In the study division, the College road is the most central nodes (Fig. 4.22)

III)   The spread and diameter of networks:-

For the study division the pi (n) index is as follow:

A)   ETA index (n)   = $\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (arcs)}}$

ETA index   = $\dfrac{20.35\text{km}}{18}$

ETA   =   1.13km / Nos.

B)   pi (n) index   = $\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$

Pi (n) index   = $\dfrac{20.35\text{km}}{6.25\text{km}}$

Pi index   =   3.25

IV)   Detour Index:-

Here, an attempt has been made to calculate the detour index for following routes:

A   Sambhaji *chowk* to Mahatma Nagar

Detour index $= 2.7/1.8 \times 100$

$= 150$

B   Sambhaji *chowk* to Mumbai naka

Detour index $= 2.4/2.1 \times 100$

$= 114.28$

C   C.B.S. to K.T.H.M College

Detour index $= 1.5/0.75 \times 100$

$= 200$

From the above calculations, It is observed that the detour is found more than 100.00, it means these places have affected by relief barriers, the route of Sambhaji *chowk* to Mumbai naka has less detour index i.e. 114.28 so it has less effect of relief barrier but the route C.B.S. to K.T.H.M college has more detour index i.e.200.00 so it has more effect of relief barriers.

SUMMARY TABLE

NASHIK CITY:- STRUCTURAL ANALYSIS OF ROAD NETWORK IN NASHIK WEST DIVISION

INDEX	FORMULA	VALUE	LIMIT VALUE	REMARK
Cyclomatic No.	e-v+p	10	Min. 5 Circuits	Low connectivity
Alpha Index	e-v+p/2v-5x100	66.66%	0% to 100% Low to High	Quite well degree connectivity
Beta Index	$B = \dfrac{e}{v}$	1.80	Less than 1 = Low 1 = Quite well More than 1 = High	High connectivity
Gamma Index	e/3(v-2)x 100	75%	0% to 35% = Low 35% to 70% = Quite well 70% to 100% = High	High connectivity
PI Index	$\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$	3.25	Less than 2 = Low More than 2 = High	High connectivity
ETA Index	$\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (Arcs)}}$	1.13 km/nos.	Less than 5 = High More than 5 = Low	High connectivity
Detour Index	Actual route distance/straight line distance X 100	If value more than 100 then observed relief barrier		Sambhaji *Chowk* (D) to Mumbai Naka (B) = 114.28% C.B.S. (A) to KTHM college (G) = 200%

THE ACCESSIBILITY:-

In the present study, the accessibility of the road network has been analyzed with the help of aforementioned methods. The important nodes have been shown in the Fig. 4.22 the 4.21.3 (A) and 4.21.3 (B) shown matrix of the nodes by different methods.

Accessibility

i)   **By shortest path matrix:-**

ROWS	A	B	C	D	E	F	G	H	I	J	TOTAL
A	0	1	1	2	3	2	1	1	1	1	**13**
B	1	0	1	2	3	4	2	2	1	2	**18**
C	1	1	0	1	2	2	2	2	1	1	**13**
D	2	2	1	0	1	2	3	3	2	2	**18**
E	3	3	2	1	0	1	1	2	2	1	**16**
F	2	4	2	2	1	0	1	2	2	1	**17**
G	1	2	2	3	1	1	0	1	1	1	**13**
H	1	2	2	3	2	2	1	0	2	2	**17**
I	1	1	1	2	2	2	1	2	0	1	**13**
J	1	2	1	2	1	1	1	2	1	0	**12**

Matrix – 4.21.3 (A)

ii)   **By the shimbel index and associated number:-**

ROWS	A	B	C	D	E	F	G	H	I	J	Associated Number	Shimbel index
A	0	1	1	2	3	2	1	1	1	1	**3**	**13**
B	1	0	1	2	3	4	2	2	1	2	**4**	**18**
C	1	1	0	1	2	2	2	2	1	1	**2**	**13**
D	2	2	1	0	1	2	3	3	2	2	**3**	**18**
E	3	3	2	1	0	1	1	2	2	1	**3**	**16**
F	2	4	2	2	1	0	1	2	2	1	**4**	**17**
G	1	2	2	3	1	1	0	1	1	1	**3**	**13**
H	1	2	2	3	2	2	1	0	2	2	**3**	**17**
I	1	1	1	2	2	2	1	2	0	1	**2**	**13**
J	1	2	1	2	1	1	1	2	1	0	**2**	**12**

Matrix – 4.21.3(B)

A	-	C.B.S	G	-	K.T.H.M College
B	-	Mumbai naka	H	-	Ashok Stambh
C	-	Mico circle	I	-	Tilak wadi
D	-	Sambhaji *chowk*	J	-	College road
E	-	Mahatma Nagar			
F	-	Sawarkar Nagar			

Accessibility

1	Most Accessible	-	College road (J),
2	More Accessible	-	C.B.S (A), Mico circle (C), K.T.H.M College (G), Tilak wadi (I),
3	Moderate Accessible	-	Mahatma Nagar (E), Sawarkar nagar (F), Ashok Stambh (H).
4	Low Accessible	-	Mumbai naka (B), Sambhaji *chowk* (D).

From Nashik west Division summary table, Matrix- 4.21.3 (A) and Matrix- 4.21.3 (B) it has been observed that, Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 10 for Nashik West division. Higher the Alpha index shows greater degree of connectivity within the network but Nashik West division it has observed 66.66% which show quite well degree of connectivity. For the study division the Beta index is 1.8; it means that the Nashik West division has highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 75% which is high connectivity. If value of pi index more than 2 then given road network is well connected, and for Nashik West division it has observed 3.25 which shows high connectivity. E.T.A. index observed 1.13km / Nos. which has shown high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers. The route Sambhaji *Chowk* to Mumbai Naka has less detour index i.e. 114.28, so it has less effect of relief barrier but the route C.B.S to K.T.H.M College has more detour index i.e.200.00 and it has more effect of relief barriers. The Shimbel index can be derived from the shortest-path matrix in the study region. The College road has lowest Shimbel index, and the associated number is 2, so it is most accessible node than the other nodes. The highest associated number 4 has observed for Savarkar Nagar,

Mumbai Naka where accessibility has found low. For the Nashik west division the mean associated number is 29/10=2.9.

Fig. 4.22

4.21.4 STRUCTURAL ANALYSIS OF ROAD NETWORK IN SATPUR DIVISION:-

A)   The Cyclomatic Number:-

$\quad$ e = $\quad$ Total number of edges (13)

$\quad$ v = $\quad$ Total number of vertices (9)

$\quad$ p = $\quad$ Total number of non- connected sub graphs (2)

For the study division, the cyclomatic number is calculates as

$$\text{Cyclomatic number} = e - v + p$$
$$= 13 - 9 + 2$$
$$= 6$$

Fig. 4.23 shows 6 fundamental circuits which are present in the Satpur Division transport network

B)   The Alpha index:-

For the study division the alpha index is calculated with the help of following formula:

$$\text{Alpha index} = e - v + p / 2v - 5 \times 100$$
$$= 13 - 9 + 2 / 2 \times 9 - 5 \times 100$$
$$= 6/13 \times 100$$
$$= 46.15\%$$

In the study division the alpha index shows quite well degree of connectivity (Fig.4.23)

C)   The beta index:-

The beta for the study division has been calculated as follows:

$$B = \frac{e}{v}$$
$$B = \frac{13}{9}$$
$$B = 1.44$$

For the study division, the beta index is 1.44; it means that the region is highly connected by road network (Fig. 4.23).

D)   The gamma index:

The gamma index for the study division is calculated as follows:

$$Y = e / 3(v-2) \times 100$$
$$Y = 13/3(9-2) \times 100$$

$$Y = 13/21 \times 100$$

$$Y = 61.90\%$$

It is observed that the study division is quite well connected by road network (Fig.4.23)

I) Centrality within a network :-

In the study division, the Satpur is the most central nodes (Fig.4.23)

III) The spread and diameter of networks:-

For the study division the pi (n) index is as follow:

A) ETA index (n) $\quad=\quad \dfrac{\text{Total network distance (km)}}{\text{Number of Edges (arcs)}}$

ETA index $\quad=\quad \dfrac{26.60\text{km}}{13}$

ETA $\quad=\quad 2.04\text{km / Nos.}$

B) pi (n) index $\quad=\quad \dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$

pi (n) index $\quad=\quad \dfrac{26.60\text{km}}{7.70\text{km}}$

Pi index $\quad=\quad 3.45$

IV) Detour index:-

Here, an attempt has been made to calculate the detour index for following routes:

A ABB circle to Gangapur

Detour index $\quad= 7.1/5.7 \times 100$

$\quad= 129.1$

B Pimpalgaon Bahula to XLO

Detour index $\quad= 5.4/2.28 \times 100$

$\quad= 236.64$

C Shivaji Nagar to Anandwalli

Detour index $\quad= 5.45/3.70 \times 100$

$\quad= 147.29$

D Satpur to Shivaji Nagar

Detour index $\quad= 4.10/3.20 \times 100$

$\quad= 128.12$

From the above mentioned calculations, It is observed that the detour is found more than 100.00, it means these places have affected by relief barriers, the route of

Satpur to Shivaji nagar has less detour index i.e. 128.12 so it has less effect of relief barrier but the route Pimpalgaon Bahula to XLO has more detour index i.e. 236.64 so it has more effect of relief barriers.

NASHIK CITY:- STRUCTURAL ANALYSIS OF ROAD NETWORK IN SATPUR DIVISION

INDEX	FORMULA	VALUE	LIMIT VALUE	REMARK
Cyclomatic No.	e-v+p	6	Min. 5 Circuits	High connectivity
Alpha Index	e-v+p/2v-5x100	46.15%	0% to 100% Low to High	Quite well degree connectivity
Beta Index	$B = \dfrac{e}{v}$	1.44	Less than 1 = Low 1 = Quite well More than 1 = High	High connectivity
Gamma Index	e/3(v-2)x 100	61.90%	0% to 35% = Low 35% to 70% = Quite well 70% to 100% = High	Quite well connectivity
PI Index	$\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$	3.45	Less than 2 = Low More than 2 = High	High connectivity
ETA Index	$\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (Arcs)}}$	2.04 km/nos.	Less than 5 = High More than 5 = Low	High connectivity
Detour Index	Actual route distance/straight line distance X 100	If value more than 100 then observed relief barrier		Satpur (C) to Shivaji Nagar (F) = 128.12% Pimpalgaon bahula (D) to XLO (L) = 236.64%

THE ACCESSIBILITY:-

In the present study, the accessibility of the road network has been analyzed with the help of aforementioned methods. The important nodes have been shown in the Fig.4.23 the 4.21.4 (A) and 4.21.4 (B) shown matrix of the nodes by different methods.

Accessibility

A) **By shortest path matrix:-**

ROWS	A	B	C	D	E	F	G	H	I	TOTAL
A	0	1	2	3	3	3	2	1	2	**17**
B	1	0	1	2	2	2	3	2	1	**14**
C	2	1	0	1	1	1	2	1	1	**10**
D	3	2	1	0	1	2	3	2	1	**15**
E	3	2	1	1	0	1	2	2	1	**13**
F	3	2	1	2	1	0	1	1	2	**13**
G	2	3	2	3	2	1	0	1	3	**17**
H	1	2	1	2	2	1	1	0	2	**12**
I	2	1	1	1	1	2	3	2	0	**13**

Matrix – 4.21.4 (A)

A) **By the shimbel index and associated number:-**

ROWS	A	B	C	D	E	F	G	H	I	Associated Number	Shimbel index
A	0	1	2	3	3	3	2	1	2	**3**	**17**
B	1	0	1	2	2	2	3	2	1	**3**	**14**
C	2	1	0	1	1	1	2	1	1	**2**	**10**
D	3	2	1	0	1	2	3	2	1	**3**	**15**
E	3	2	1	1	0	1	2	2	1	**3**	**13**
F	3	2	1	2	1	0	1	1	2	**3**	**13**
G	2	3	2	3	2	1	0	1	3	**3**	**17**
H	1	2	1	2	2	1	1	0	2	**2**	**12**
I	2	1	1	1	1	2	3	2	0	**3**	**13**

Matrix – 4.21.4 (B)

Nodes: Total 09

A	-	ABB circle	G	-	Gangapur
B	-	I.T.I signal	H	-	Anandwali
C	-	Satpur	I	-	X.L.O
D	-	Pimpalgaon Bahula			
E	-	Ashok Nagar			
F	-	Shivaji Nagar			

Accessibility

1	Most Accessible	-	Satpur (C),
2	More Accessible	-	Ashok Nagar (E), Shivaji Nagar (F), Anandwali (H),X.L.O (I)
3	Moderate Accessible	-	I.T.I signal (B), Pimpalgaon bahula (D).
4	Low Accessible	-	ABB circle (A), Gangapur (G).

From Satpur Division summary table, Matrix- 4.21.4 (A) and Matrix- 4.21.4 (B) it has been observed that, Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 6 for Satpur division. Higher the Alpha index shows greater degree of connectivity within the network but for Satpur division it has observed only 46.15 % which show quite well degree of connectivity. For the study division the Beta index is 1.44; it means that the Satpur division is highly connected by road network. Gamma index describes connectivity of networks in percent which is observed 61.90% which is quite well connectivity. If the value of pi index is more than 2 then given road network is well connected. For Satpur division, it is observed 3.45, which shows high connectivity. E.T.A. index observed 2.04 km/ Nos., which has shown high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers. The route Satpur to Shivaji Nagar has less detour index i.e. 128.12 so it has less effect of relief barrier but the route Pimpalgaon Bahula to XLO has more detour index i.e. 236.64 so it has more effect of relief barriers. The Shimbel index can be derived from the shortest-path matrix in the study division. The Satpur has lowest Shimbel index and the associated number is 2, so it is most accessible node than the other nodes. The highest associated

number 3 has observed for ABB Circle, I.T.I. Signal, Pimpalgaon Bahula, Ashok Nagar, Shivaji Nagar, Gangapur, and X.L.O. where accessibility has found low. For the Satpur division the mean associated number is 25/9=2.77.
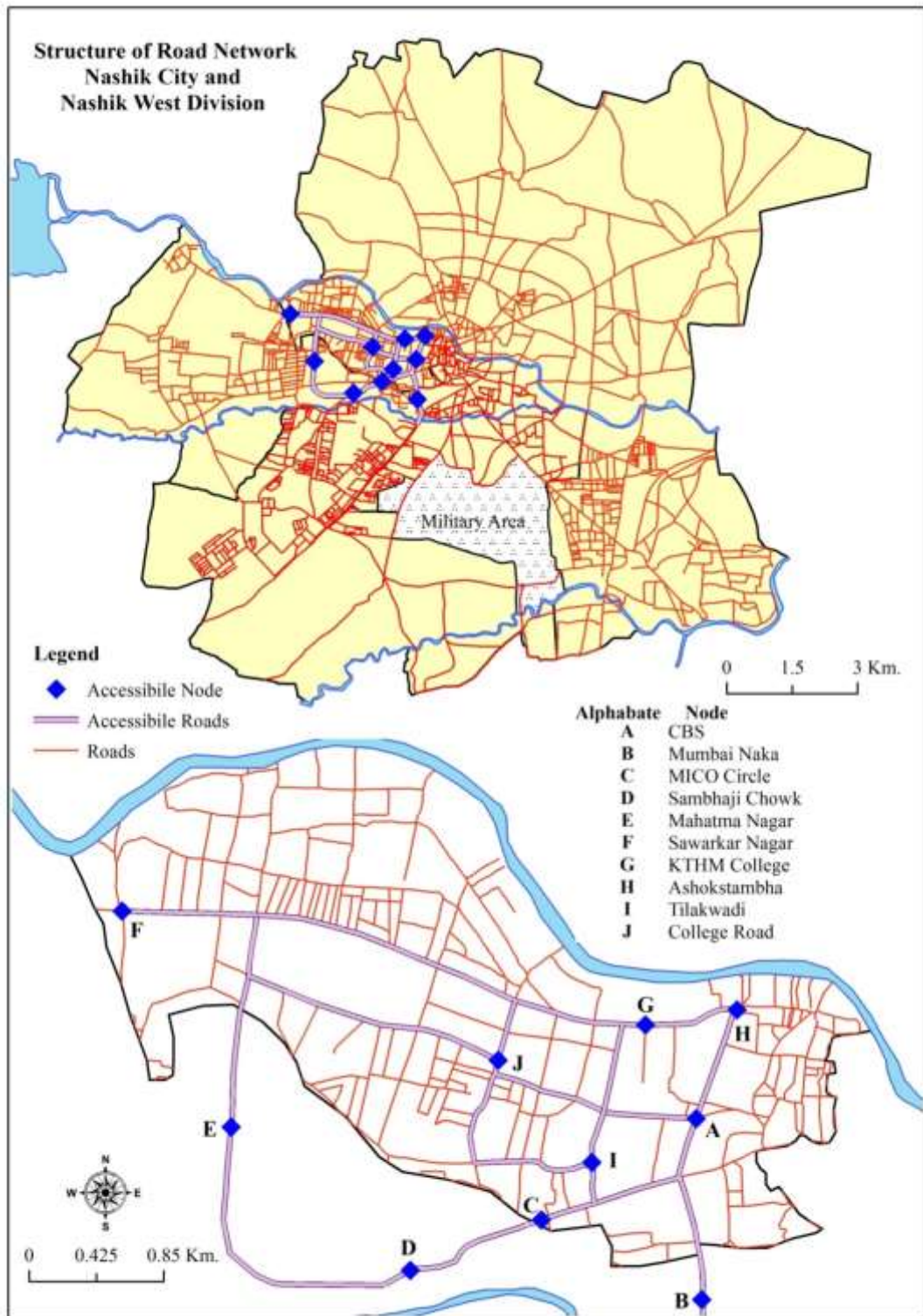

Fig. 4.23

4.21.5 STRUCTURAL ANALYSIS OF ROAD NETWORK IN NASHIK ROAD DIVISION:-

A)   The Cyclomatic Number:-

e =   Total number of edges (15)

v =   Total number of vertices (10)

p =   Total number of non- connected sub graphs (3)

For the study division, the cyclomatic number is calculates as

$$\text{Cyclomatic number} = e - v + p$$
$$= 15\text{-}10\text{+}3$$
$$= 8$$

Fig. 4.24 shows 8 fundamental circuits which are present in the Nashik Road Division transport network

B)   The Alpha index:-

For the study division the alpha index is calculated with the help of following formula:

$$\text{Alpha index} = e - v\text{+}p \,/2v\text{-}5x100$$
$$= 15\text{-}10\text{+}3/2x10\text{-}5x100$$
$$= 8/15x100$$
$$= 53.33\%$$

In the study division the alpha index shows quite well degree of connectivity (Fig. 4.24)

C)   The beta index:-

The beta for the study division has been calculated as follows:

$$B = \frac{e}{v}$$
$$B = \frac{15}{10}$$
$$B = 1.5$$

For the study division, the beta index is 1.5; it means that the division is highly connected by road network (Fig.4.24)

D)   The gamma index:

The gamma index for the study division is calculated as follows:

$$Y = e/3(v\text{-}2) \,x100$$

$$Y = 15/3(10-2) \text{ x}100$$

$$Y = 62.5\%$$

It is observed that the study division is quite well connected by road network (Fig.4.24)

II)   Centrality within a network :-

`   In the study division, the Bytco *chowk* is the most central nodes (Fig.4.24)

III)   The spread and diameter of networks:-

For the study division the pi (n) index is as follow:

A)   ETA index (n)   = $\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (arcs)}}$

ETA Index   = $\dfrac{38.3\text{km.}}{15}$

ETA   =   2.55km. / Nos.

B)   pi (n) index   = $\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$

pi (n) index   = $\dfrac{38.3 \text{ km.}}{10 \text{ km.}}$

Pi index   =   3.83 km.

IV)   Detour index:-

Here, an attempt has been made to calculate the detour index for following routes:

A   Samangaon to Chehadi

Detour index   = 4.1km/1.6km x100

= 256.25

B   Samangaon to Eklahara p.s

Detour index   = 6.5km/2.00kmx100

= 325.00

C   Vihitgaon to Chehedi

Detour index   = 3.1km/2.7km x100

= 114.81

D   Jaybhavani road to Vihitgaon

Detour index   = 1.6km/1.09km x100

= 146.78

From the above calculations, it is observed that the detour is found more than 100, it means these places have affected by relief barriers, the route of Vihitgaon to

Chehedi has less detour index i.e. 114.81 so it has less effect of relief barrier but the Route Samangaon to Eklahara power station has more detour index i.e. 325.00 so it has more effect of relief barriers.

SUMMARY TABLE

NASHIK CITY:- STRUCTURAL ANALYSIS OF ROAD NETWORK IN NASHIK ROAD DIVISION

INDEX	FORMULA	VALUE	LIMIT VALUE	REMARK
Cyclomatic No.	e-v+p	8	Min. 5 Circuits	High connectivity
Alpha Index	e-v+p/2v-5x100	53.33%	0% to 100% Low to High	Quite well degree connectivity
Beta Index	$B = \dfrac{e}{v}$	1.5	Less than 1 = Low 1 = Quite well More than 1 = High	High connectivity
Gamma Index	e/3(v-2)x 100	62.50%	0% to 35% = Low 35% to 70% = Quite well 70% to 100% = High	Quite well connectivity
PI Index	$\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$	3.83	Less than 2 = Low More than 2 = High	High connectivity
ETA Index	$\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (Arcs)}}$	2.55 km/nos.	Less than 5 = High More than 5 = Low	High connectivity
Detour Index	Actual route distance/straight line distance X 100	If value more than 100 then observed relief barrier.	Vihitgaon (F) to Chehedi (H) = 114.81% Samangaon (I) to Eklahara P.S. (B) = 325.00%	

THE ACCESSIBILITY:-

In the present study, the accessibility of the road network has been analyzed with the help of aforementioned methods. The important nodes have been shown in the Fig.4.24 the 4.21.5 (A) and 4.21.5 (B) shown matrix of the nodes by different methods.

Accessibility

A) By shortest path matrix:-

ROWS	A	B	C	D	E	F	G	H	I	J	TOTAL
A	0	1	2	2	1	2	1	1	1	1	**12**
B	1	0	1	2	2	3	2	1	1	1	**14**
C	2	1	0	1	2	3	2	2	3	1	**17**
D	2	2	1	0	1	3	2	2	2	1	**16**
E	1	2	2	1	0	2	1	2	2	1	**14**
F	2	3	3	3	2	0	1	2	3	2	**21**
G	1	2	2	2	1	1	0	1	2	1	**13**
H	1	1	2	2	2	2	1	0	1	1	**13**
I	1	1	3	2	2	3	2	1	0	1	**16**
J	1	1	1	1	1	2	1	1	1	0	**10**

Matrix – 4.21.5(A)

B) By the shimbel index and associated number:-

ROWS	A	B	C	D	E	F	G	H	I	J	Associated Number	Shimbel index
A	0	1	2	2	1	2	1	1	1	1	**2**	12
B	1	0	1	2	2	3	2	1	1	1	**3**	14
C	2	1	0	1	2	3	2	2	3	1	**3**	17
D	2	2	1	0	1	3	2	2	2	1	**3**	16
E	1	2	2	1	0	2	1	2	2	1	**2**	14
F	2	3	3	3	2	0	1	2	3	2	**3**	21
G	1	2	2	2	1	1	0	1	2	1	**2**	13
H	1	1	2	2	2	2	1	0	1	1	**2**	13
I	1	1	3	2	2	3	2	1	0	1	**3**	16
J	1	1	1	1	1	2	1	1	1	0	**2**	10

Matrix – 4.21.5(B)

Nodes: Total 10

A	-Nashik road railway station	G	-	Deolali Cantonment (Lam Road)
B	-Eklahara power station	H	-	Chehadi
C	-Jail road	I	-	Samangaon
D	-Upnagar	J	-	Bytco *chowk*
E	-Jay bhavani road			
F	-Vihit Gaon			

Accessibility

1	Most Accessible	-	Bytco *chowk* (J),
2	More Accessible	-	Nashik road railway station (A),
			Eklahara power station (B),
			Jay Bhavani road (E),
			Deolali cantonment (LAM Road) (G),
			Chehadi (H),
3	Moderate Accessible	-	Jail road(C), Upnagar (D),
			Samangaon (I),
4	Low Accessible	-	Vihit gaon (F)

From Nashik road Division summary table, Matrix- 4.21.5 (A) and Matrix- 4.21.5 (B) it has been observed that, Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 8 for Nashik road division. Higher the Alpha index shows high degree of connectivity within the network but for Nashik road division it has observed 53.33% which show quite well degree of connectivity. For the study division the Beta index is 1.5; it means that the Nashik road division is highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 62.50% which has shown quite well connectivity. If value of pi index more than 2 then given road network is well connected, for Nashik road division it has observed 3.83 which show high connectivity, E.T.A. index observed 2.55 km / Nos. which has high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers, the route Vihitgaon to Chehedi has less detour index i.e. 114.81 so it has less effect of relief barrier but the route Samangaon to Eklahara P.S has more detour index i.e. 325.00 so it has more effect of relief barriers. The shimbel index can be derived from the shortest-

path matrix in the study region. The Bytco *chowk* has lowest Shimbel index and the associated number is 2, so it is most accessible node than the other nodes. The highest associated number 3 has observed for Eklahara power station, Jail road, Upnagar, Vihitgaon and Samangaon where accessibility has found low. For the Nashik road division the mean associated number is 25/10=2.5.
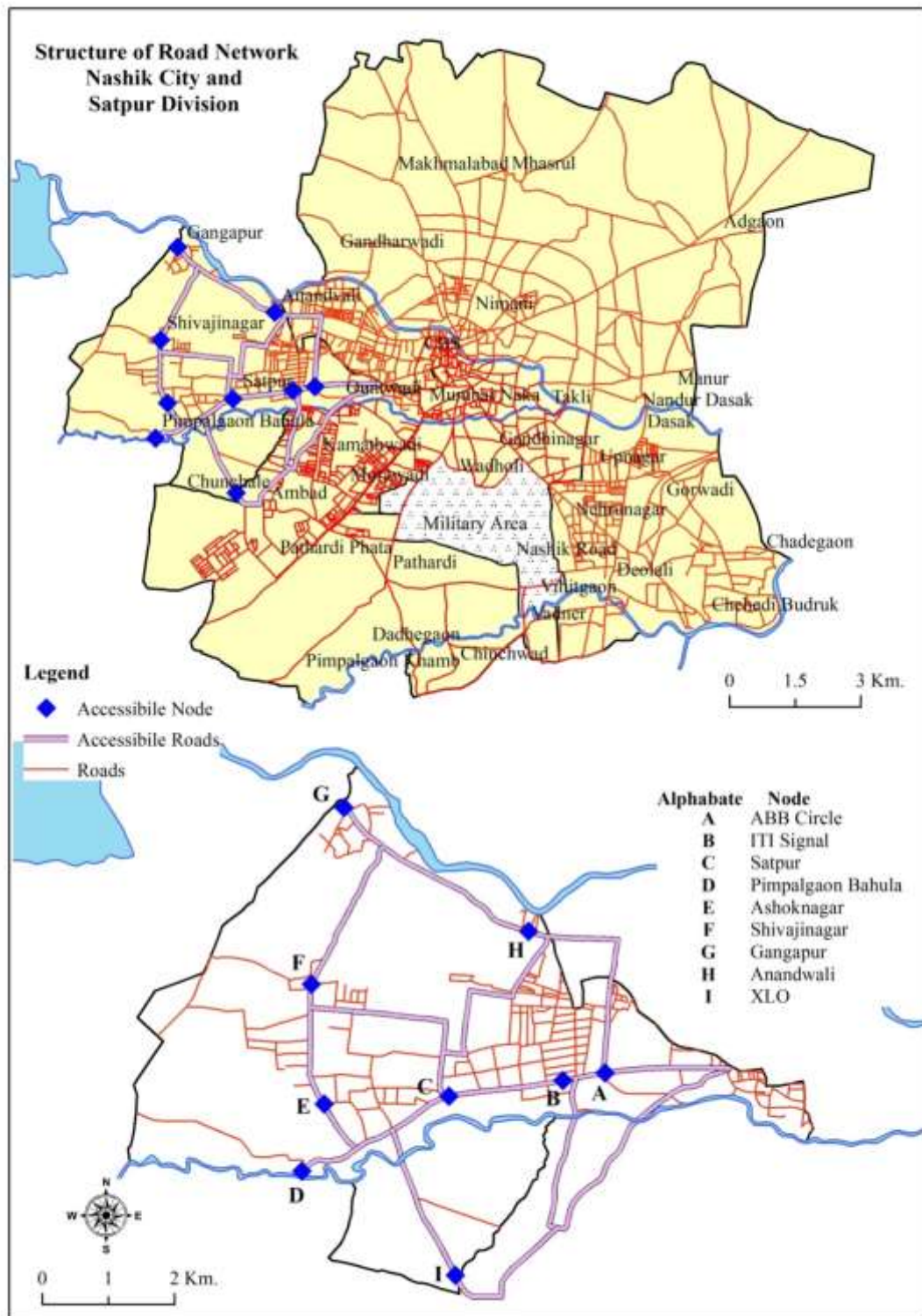

Fig. 4.24

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4.21.6 STRUCTURAL ANALYSIS OF ROAD NETWORK IN NASHIK EAST DIVISION:-

A)   The Cyclomatic Number:-

e =   Total number of edges (17)

v =   Total number of vertices (11)

p =   Total number of non- connected sub graphs (1)

For the study division, the cyclomatic number is calculates as

Cyclomatic number   =   e – v + p

=   17 – 11 + 1

=   7

Fig. 4.25 shows 7 fundamental circuits which are present in the Nashik East Division transport network

B)   The Alpha index:-

For the study division the alpha index is calculated with the help of following formula:

Alpha index = e – v + p /2v-5x100

= 17-11+1/2x11-5x100

=   7/17x100

=   41.18%

In the study division the alpha index shows quite well degree of connectivity (Fig.4.25)

C)   The beta index:-

The beta for the study division has been calculated as follows:

$$B = \frac{e}{v}$$

$$B = \frac{17}{11}$$

B = 1.54

For the study division, the beta index is 1.54; it means that the division is highly connected by road network (Fig.4.25)

D)   The gamma index:

The gamma index for the study division is calculated as follows:

Y = e/3(v-2) x100

Y = 17/3(11-2) x100

Y = 62.96%

It is observed that the study division is quite well connected by road network (Fig.4.25)

II)   Centrality within a network:-

In the study division, the Mumbai naka is the most central nodes (Fig.4.25)

III)   The spread and diameter of networks:-

For the study division the pi (n) index is as follow:

A)   ETA index (n)   = $\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (arcs)}}$

ETA index   = $\dfrac{28.31 \text{ km.}}{17}$

ETA   =   1.66 km / Nos.

B)   pi (n) index   = $\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$

Pi (n) index   = $\dfrac{28.31 \text{ km.}}{5.4 \text{ km.}}$

Pi index   =   5.24

IV)   Detour index:-

Here, an attempt has been made to calculate the detour index for following routes:

A   Mumbai naka to Indira Nagar

Detour index   = 3.1km/2km x100

= 155

B   Takali phata to Bhadrakali

Detour index   = 2.15km/1.3km x100

= 165.38

From the above calculations, It is observed that the detour is found more than 100.00, it means these places have affected by relief barriers, the route of Mumbai naka to Indira Nagar has less detour index i.e. 155.00 so it has less effect of relief barrier but the route Takali phata to Bhadrakali has more detour index i.e. 165.38 so it has more effect of relief barriers.

NASHIK CITY:- STRUCTURAL ANALYSIS OF ROAD NETWORK IN NASHIK EAST DIVISION

INDEX	FORMULA	VALUE	LIMIT VALUE	REMARK
Cyclomatic No.	e-v+p	7	Min. 5 Circuits	High connectivity
Alpha Index	e-v+p/2v-5x100	41.18%	0% to 100% Low to High	Quite well degree connectivity
Beta Index	$B = \dfrac{e}{v}$	1.54	Less than 1 = Low 1 = Quite well More than 1 = High	High connectivity
Gamma Index	e/3(v-2)x 100	62.96%	0% to 35% = Low 35% to 70% = Quite well 70% to 100% = High	Quite well connectivity
PI Index	$\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$	5.24	Less than 2 = Low More than 2 = High	High connectivity
ETA Index	$\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (Arcs)}}$	1.66 km/nos.	Less than 5 = High More than 5 = Low	High connectivity
Detour Index	Actual route distance/straight line distance X 100	If value more than 100 then observed relief barrier	Mumbai Naka (K) to Indira Nagar (J) = 155% Takali Phata (G) to Bhadrakali (D) = 165.38%

THE ACCESSIBILITY:-

In the present study, the accessibility of the road network has been analyzed with the help of above all methods. The important nodes have been shown in the Fig. 4.25, 4.21.6 (A) and 4.21.6 (B) shows matrix of these nodes by different methods.

Accessibility

A)   **By shortest path matrix:-**

ROWS	A	B	C	D	E	F	G	H	I	J	K	TOTAL
A	0	1	1	2	2	2	3	4	3	2	1	**21**
B	1	0	2	1	2	3	4	4	4	3	2	**26**
C	1	2	0	1	1	1	2	2	3	2	1	**16**
D	2	1	1	0	1	2	3	3	4	3	2	**22**
E	2	2	1	1	0	1	2	2	2	2	1	**16**
F	2	3	1	2	1	0	1	1	1	1	1	**14**
G	3	4	2	3	2	1	0	1	2	2	2	**22**
H	4	4	2	3	2	1	1	0	1	2	2	**22**
I	3	4	3	4	2	1	2	1	0	1	2	**23**
J	2	3	2	3	2	1	2	2	1	0	1	**19**
K	1	2	1	2	1	1	2	2	2	1	0	**15**

Matrix – 4.21.6 (A)

B)   **By the shimbel index and associated number:-**

ROWS	A	B	C	D	E	F	G	H	I	J	K	Associated Number	Shimbel Index
A	0	1	1	2	2	2	3	4	3	2	1	**4**	**21**
B	1	0	2	1	2	3	4	4	4	3	2	**4**	**26**
C	1	2	0	1	1	1	2	2	3	2	1	**3**	**16**
D	2	1	1	0	1	2	3	3	4	3	2	**4**	**22**
E	2	2	1	1	0	1	2	2	2	2	1	**2**	**16**
F	2	3	1	2	1	0	1	1	1	1	1	**3**	**14**
G	3	4	2	3	2	1	0	1	2	2	2	**4**	**22**
H	4	4	2	3	2	1	1	0	1	2	2	**4**	**22**
I	3	4	3	4	2	1	2	1	0	1	2	**4**	**23**
J	2	3	2	3	2	1	2	2	1	0	1	**3**	**19**
K	1	2	1	2	1	1	2	2	2	1	0	**2**	**15**

Matrix – 4.21.6 (B)

Nodes: Total 11

A	-	Ashok Stambh	G	-	Takali phata
B	-	R.K	H	-	Agar takali
C	-	Shalimar	I	-	Wadala
D	-	Bhadrakali	J	-	Indira Nagar
E	-	*Chowk* mandai	K	-	Mumbai naka
F	-	Dwarka			

Accessibility

1	Most Accessible	-	Dwarka(F).
2	More Accessible	-	Shalimar(C), *Chowk* mandai (E) Mumbai naka (K).
3	Moderate Accessible	-	Ashok Stambh (A), Bhadrakali (D), (E)Takali phata (G), Agar takali (H) Indira Nagar(J).
4	Low Accessible	-	R.K (B), Wadala (I).

From Nashik east Division summary table, Matrix- 4.21.6(A) and Matrix-4.21.6 (B) it has been observed that, Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 7 for Nashik East division. Higher the Alpha index shows high degree of connectivity within the network but for Nashik East division it has observed 41.18% which show quite well degree of connectivity. For the study division the Beta index is 1.54; it means that the Nashik East division is highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 62.96% which has shown quite well connectivity. If value of pi index more than 2 then given road network is well connected, for Nashik East division it has observed 5.24 which show high connectivity, E.T.A. index observed 1.66 km / Nos. which has high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers, the route Mumbai naka to Indira Nagar has less detour index i.e. 155.00 so it has less effect of relief barrier but the route Takali Phata to Bhadrakali has more detour index i.e. 165.38 so it has more effect of relief barriers. The shimbel index can be derived from the shortest-path matrix in the study region. The Dwarka has lowest Shimbel index and

the associated number is 2, so it is most accessible node than the other nodes. The highest associated number 4 has observed for Ashok Stambh, R.K, Bhadrakali, Takali Phata, Agar takali, Wadala where accessibility has found low. For the Nashik east division the mean associated number is 37/11=3.36.

Fig. 4.25

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4.21.7 ANALYSIS FOR STRUCTURE OF ROAD NETWORK WITHIN ALL DIVISIONS OF STUDY REGION:-

A)   The Cyclomatic Number:-

$$e = \text{Total number of edges (11)}$$

$$v = \text{Total number of vertices (6)}$$

$$p = \text{Total number of non- connected sub graphs (1)}$$

For the study division, the cyclomatic number is calculates as

$$\text{Cyclomatic number} = e - v + p$$

$$= 11\text{-}6\text{+}1$$

$$= 6$$

Fig. 4.26 shows 6 fundamental circuits which are present transport network within all Divisions.

B)   The Alpha index:-

For the study divisions the alpha index is calculated with the help of following formula:

Alpha index = $e - v + p$ /2v-5x100

$$= 11\text{-}6\text{+}1/2x6\text{-}5x100$$

$$= 6/7x100$$

$$= 85.71\%$$

In the study divisions the alpha index shows high degree of connectivity (Fig.4.26)

C)   The beta index:-

The beta for the study divisions has been calculated as follows:

$$B = \frac{e}{v}$$

$$B = \frac{11}{6}$$

$$B = 1.83\%$$

For the study divisions, the beta index is 1.83; it means that the divisions is highly connected by road network (Fig.4.26)

D)   The gamma index:

The gamma index for the study divisions is calculated as follows:

Y = e/3(v-2) x100

Y = 11/3(6-2) x100

$$Y = 11/12 \times 100$$

$$Y = 91.66\%$$

it is observed that the study divisions is high connected by road network (Fig.4.26)

I)   Centrality within a network :-

In the study divisions, the Mumbai naka is the most central nodes (Fig.4.26)

III)   The spread and diameter of networks:-

For the study divisions the pi (n) index is as follow:

A)   ETA index (n)   = $\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (arcs)}}$

ETA index   = $\dfrac{54.8 \text{km}}{11}$

ETA   =   4.98km / Nos.

B)   pi (n) index   = $\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$

Pi (n) index   = $\dfrac{54.8 \text{km}}{11 \text{km}}$

Pi index   =   4.98

IV)   Detour index:-

Here, an attempt has been made to calculate the detour index for following routes:-

A   Nimani to Bytco *chowk*

Detour index $= 10.35/7.9 \times 100$

$= 131.01$

B   College road to Bytco *chowk*

Detour index $= 11.2/8.73 \times 100$

$= 128.29$

B   College road to Pathardi Phata

Detour index $= 10.5/5.36 \times 100$

$= 195.89$

From the above calculations, It is observed that the detour is found more than 100.00, it means these places have affected by relief barriers, the route of College road to Bytco *chowk* has less detour index i.e. 128.29 so it has less effect of relief barrier but the route College road to Pathardi Phata has more detour index i.e. 195.89 so it has more effect of relief barriers.

SUMMARY TABLE

NASHIK CITY: ANALYSIS FOR STRUCTURE OF ROAD NETWORK WITHIN ALL DIVISIONS OF STUDY REGION

INDEX	FORMULA	VALUE	LIMIT VALUE	REMARK
Cyclomatic No.	e-v+p	6	Min. 5 Circuits	High connectivity
Alpha Index	e-v+p/2v-5x100	85.71%	0% to 100% Low to High	High degree connectivity
Beta Index	$B = \dfrac{e}{v}$	1.83	Less than 1 = Low 1 = Quite well More than 1 = High	High connectivity
Gamma Index	e/3(v-2)x 100	91.66%	0% to 35% = Low 35% to 70% = Quite well 70% to 100% = High	Quite well connectivity
PI Index	$\dfrac{\text{Total distance of network}}{\text{Distance of diameter}}$	4.98	Less than 2 = Low More than 2 = High	High connectivity
ETA Index	$\dfrac{\text{Total network distance (km)}}{\text{Number of Edges (Arcs)}}$	4.98 km/nos.	Less than 5 = High More than 5 = Low	High connectivity
Detour Index	Actual route distance/straight line distance X 100	If value more than 100 then observed relief barrier	College road to Bytco *Chowk* = 128.29% College road to Pathardi Phata = 195.89%

THE ACCESSIBILITY:-

In the present study, the accessibility of the road network has been analyzed with the help of aforementioned methods. The important nodes have been shown in the Fig.4.26, 4.21.7 (A) and 4.21.7 (B) shown matrix of the nodes by different methods.

Accessibility

A)   **By shortest path matrix:-**

ROWS	A	B	C	D	E	F	TOTAL
A	0	2	2	2	1	1	**8**
B	2	0	1	2	2	1	**8**
C	2	1	0	1	1	1	**6**
D	2	2	1	0	1	1	**7**
E	1	2	1	1	0	1	**6**
F	1	1	1	1	1	0	**5**

Matrix – 4.21.7 (A)

B)   **By the shimbel index and associated number:-**

ROWS	A	B	C	D	E	F	Associated Number	Shimbel index
A	0	2	2	2	1	1	**2**	8
B	2	0	1	2	2	1	**2**	8
C	2	1	0	1	1	1	**2**	6
D	2	2	1	0	1	1	**2**	7
E	1	2	1	1	0	1	**2**	6
F	1	1	1	1	1	0	**1**	5

Matrix – 4.21.7 (B)

Nodes: Total 06

A	-	Nimani bus stand	D	-	Satpur
B	-	Bytco *chowk*	E	-	College road
C	-	Pathardi phata	F	-	Dwarka

1	-	Most Accessible	-	Dwarka (F).
2	-	More Accessible	-	Pathardi Phata (C),
				College road (E)
3	-	Moderate Accessible	-	Satpur (D),
4	-	Low Accessible	-	Nimani bus stand (A),
				Bytco *chowk* (B),

From All combine Division summary table, Matrix- 4.21.6(A) and Matrix-4.21.6 (B) it has been observed that, Cyclomatic numbers, which tell about present of fundamental circuit of a given transportation, network which has observed 6 for All Combine division. Higher the Alpha index shows greater degree of connectivity within the network but for All Combine division it has observed 85.71% which show high degree of connectivity. For the study division the Beta index is 1.83; it means that the All Combine division is highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 91.66% which show high connectivity. If value of pi index more than 2 then given road network is well connected, All Combine division it is observed 4.98 which show high connectivity, E.T.A. index observed 4.98 km / Nos. which has shown high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers, the route College road to Bytco *chowk* has less detour index i.e. 128.29 so it has less effect of relief barrier but the route College road to Pathardi Phata has more detour index i.e. 195.89 so it has more effect of relief barriers. The shimbel index can be derived from the shortest-path matrix in the all combine division. The Dwarka has lowest Shimbel index and the associated number is 1, so it is most accessible node than the other nodes. The highest associated number 2 has observed for Nimani bus stand, Bytco *chowk*, Pathardi Phata, Satpur, College road where accessibility has found low. For the all combine division the mean associated number is 11/6=1.83.

Divisionwise Structure of Road Network

Legend
- ◆ Accessibile Node
- — Accessibile Roads
- — Roads

Fig. 4.26

* DELIMITATION OF CBD IN NAŞHIK CITY

THE DELIMITATION OF THE CENTRAL BUSINESS DISTRICT

Many geographer has attempted several time to delimit the C.B.D. i.e. delimit its size in town. To define limit of C.B.D., they take help of number of registration and valuation. The studies have included process change and evaluations with time for a single C.B.D. have been defined in precise definition.

If all towns of India has been observed, one common element we get i.e. structure of C.B.D. Where commercial activity like shop, Mall, etc. are observed. The C.B.D. is observed in the heart of city. Commercial hub is module on which rest of city is structured.

There are various methods which have been applied to delimit the CBD. Murphy and Vance (1954), Herbert (1961), Davies, D.H.(1965), have studies and delimitated the CBD of American cities by using various criteria, such as land values, rent values, rateable no. index and other indices. But these indices have been changed from time to time. The result is that, most of the investigators turn quite properly to the land uses themselves as the simplest, most direct evidence to be utilized in determining the spatial characteristics of the CBD.

4.22 APPRAISAL OR ASSESSED LAND VALUES

The assessed land values mean the price of the land estimated by competent private assessors. The land value is reduced to some competent unit of area or of street frontage which would be powerful indicator of the CBD at whose margins values should fall rapidly.

To Study the assessed land values of Nashik city, the Central business district is a part of city, which is unique in its land use and distinctive function, and is thus different from all other parts of the city.

4.23 MARKET LAND VALUES

The market land values meant the actual value/price of the land at the time of sale. Generally, market values are higher than the assessed land values because of potential and Importance of that land according to use and its location. So these market land values vary from itself land value according to potential, location and Importance of that land. These values change according to physical status, Road frontage, Road Width, Surrounding Area, Distance for minimum transport to educational, Shopping Centers, Main Offices amenities etc.

4.24   RENT VALUES.

Here, an attempt has been made to delimit the CBD on the basis of rent values. The data of rent values per 100 sq. feet unit area of the street frontage have been obtained through field work. Then the lines of equal rent values have been drawn on the map and analyzed.

Rental values are available from various developers which are at least directly linked to rent value, indirectly since the rentable value is assessed as the rent of a building not simply of the urban land, so that other complexities are introduced. In making this assessment two main factors are considered. The first is the physical condition, including space, nature of frontage and access; the second is site advantages, a less tangible factor which includes the potential value of the site based on experience and on current rents which are known to the assessor.

On the basis of these assessed values of various 103 market areas or paths out of 6 divisions has been taken into consideration to know the avg. Land Value, Market Value, Rent value in the study region.

TABLE NO. IV-X

NASHIK CITY: ACCESSED LAND VALUES, MARKET LAND VALUES

AND RENT VALUES (Per Sq. m) (2014)

SR. NO	SHIWAR	AREA	LAND VALUE	MARKET VALUE	RENT VALUE
NASHIK EAST DIVISION (2014)					
1	NASHIK GAOTHAN	BHADRAKALI	66,550	70,000	1,000
2		ASHOK STAMBH	47,500	75,000	1,200
3		R.K.	47,500	70,000	1,100
4		MAKHAMLABAD NAKA	19,800	30,000	1,500
5		*CHOWK* MANDAI	24,500	50,000	1,000
6	NASHIK TPS-1	DWARKA	24,500	32,000	1,500
7		MUMBAI NAKA	41,500	60,000	1,700
8		C.B.S.	58,800	70,000	2,000
9		SARADA CIRCLE	25,100	55,000	1,500
10		SHALIMAR	63,100	70,000	1,500
11		AMARDHAM NASHIK	8,600	10,000	500

12	NASHIK TPS-2	BHABHA NAGAR	14,700	35,000	2,000
13	NASHIK	INDIRA NAGAR	21,000	30,000	1,500
14		KATHE LEN	11,000	30,000	1,500
15	WADALA	WADALA (RES)	11,000	20,000	1,500
16		WADALA (AGRI)	1,100	4,000	500
17	AGAR TAKALI	AGARA TAKALI(RES)	10,500	17,000	1,200
18		AGARA TAKALI(AGRI)	1,300	3,000	400
		TOTAL	**4,98,050**	**7,31,000**	**23,100**

Source: 1) Ready Reckoner Book, Nashik city (2014)

2) Registration office, Nashik city (2014)

It is observed from the Table No. IV-X and Fig. 4.27 that the Assessed Land Values are higher of the land which is near and along roads stretches from Bhadrakali to Shalimar to C.B.S. to Ashok Stumbh in Nashik East division which is old core part of city. The assessed land values ranges between Rs.66550 per sq. m to Rs. 47500 per sq.m are found more near Bhadrakali, Shalimar, and C.B.S. This area is the old CBD of the Nashik city, so the assessed land values are higher than of the other areas of the Study Division. The peripheral areas of the Nashik East Division have low assessed land values. The assessed land values have showing decreasing trend from core part to outer parts of the division.

In the Nashik East Division , the Market Land values are ranging from Rs. 75000 to 10000 per sq.m. The highest market land value is found near Ashok stumbh (Rs 75000 per sq.m) followed by Bhadrakali and Shalimar area (Rs 70000 per sq.m) Mumbai Naka (Rs 60000 per sq.m) *Chowk* Mandai (Rs 50000 per sq.m) Bhabha Nagar (Rs 35000 per sq.m), Kathe lane and Indira Nagar (Rs 30000 per sq.m), Wadala (Rs 20000 per sq.m) and Agartakali (Rs 10500 per sq.m). The low market land values are found in Amardham Nashik (Rs 10000 per sq.m). These areas have lower value due to uses of that land.

In Nashik East Division , the Rent Values are ranging from Rs. 2000 to 500 per 100 sq. feet. The highest Rent Value is found near C.B.S. and Bhabha Nagar (Rs 2000 per 100 sq. feet.) followed by Mumbai Naka (Rs 1700 per 100 sq. feet.), Makhamalabad Naka, Dwarka, Shalimar, Indira Nagar and Kathe lane (Rs 1500 per 100 sq. feet.), Ashok Stumbh and Agartakali (Rs 1200 per 100 sq. feet.) R.K   (Rs 1100 per 100 sq. feet.), *Chowk* Mandai and Bhadrakali   (Rs 1000 per 100 sq. feet.)

The Table No. IV-X and Fig. 4.27gives clear idea about the market land values of the Study division. The low market land values are found in Amardham Nashik (Rs 500 per 100 sq. feet.). These areas have lower value due to uses of that land. It is the highest for residential more than Rs. 2000/100 sq. feet per month beside of C.B.S. and Bhabha Nagar area because in this area daily new public arrives for doing their business from outside of the city.

The C.B.S, Trimbak road, Canada corner, Tilak wadi, Gadkari *chowk*, Gangapur road, Mahatma Nagar, Ashok Stambh and R.K have assessed land values between Rs. 63100 and Rs. 47500 per sq.m. because the main road of Nashik city stretches from these areas, so the frontage of road has higher land values than the inner parts of the roads. The frontage areas of the roads has got commercial potential, so the land values are higher as compared to that of the inner parts of the Study region.

There is the highest rent value for commercial land which is more than Rs. 3000 per 100 sq. feet per month near Ambad and Satpur M.I.D.C and these area also has highest industrial rent values more than Rs. 5000 per 100 sq. feet per month. C.B.S., Gangapur road, and college road have higher rent values i.e. over Rs. 2000 per 100 sq. feet per month because it is a new CBD which has been developed recently.

The peripheral areas of city have less rent values below Rs.1000 per 100sq.feet per month. In these division areas along with the main street have higher rent values. Rent values in the Study division decrease from central part to outward. The Table No. IV-X and Fig. 4.27and contour map 4.1, 4.2, 4.3 give clear idea about the Assess land values, Market land values and Rent values of the Nashik East division.

Fig. 4.27

TABLE NO. IV-XI

NASHIK CITY: ACCESSED LAND VALUES, MARKET LAND VALUES

AND RENT VALUES (Per Sq. m) (2014)

SR. NO	SHIWAR	AREA	LAND VALUE	MARKET VALUE	RENT VALUE
		NASHIK ROAD DIVISION (2014)			
1	DEOLALI	DEOLALI (RES)	15,000	30,000	1,500
2		DEOLALI (AGRI)	2,300	4,000	400
3		BYTCO *CHOWK*	21,000	38,000	1,500
4		SAMANGAON	10,100	15,000	1,200
5	VIHITGAON	VIHITGAON(RES)	6,500	15,000	1,200
6		VIHITGAON(AGRI)	1,300	4,000	450
7	CHEHEDI	CHEHEDI(RES)	6,000	15,000	1,200
8		CHEHEDI(AGRI)	1,100	4,000	425
9		CHEHEDI (INDUSTRIAL)	1,900	5,000	2,500
10	CHADEGAON	CHADEGAON(RES)	1,500	5,000	800
11		CHADEGAON(AGRI)	900	2,000	350
12		CHADEGAON(INDUSTRIAL)	2,700	4,500	1,200
13	DASAK	DASAK (RES)	6,000	18,000	1,250
14		DASAK (AGRI)	1,500	3,000	500
15	PANCHAK	PANCHAK (RES)	5,500	12,000	900
16		PANCHAK (AGRI)	1,000	3,000	400
17		PACHANK (INDUSTRIAL)	2,100	5,000	2,000
		TOTAL	**86,400**	**1,82,500**	**17,775**

Source: 1) Ready Reckoner Book, Nashik city (2014)

2) Sub Registration office, Nashik Road (2014)

It is observed from the Table No. IV- XI and Fig. 4.28 that the Assessed Land Values are higher near and along roads stretches from Bytco *chowk* to Samangaon (NH-50) and Bytco *Chowk* to Deolali (Lam Raod) in Nashik Road division which is old core part of Deolali Municipal Corporation. The assessed land

values ranges between Rs. 21000 per sq.m. to Rs. 15000 per sq.m. are found near Bytco *Chowk*, Deolali Gaon (Nashik Raod railway Station area), Samangaon (Government Polytechnic college) area is the old CBD of the Deolali Municipal Council so the assessed land values are seen higher than of the other areas of the Study Division. The peripheral areas of the Nashik Road Division have low assessed land values.

In Nashik Road Division , the Market Land values are ranging from Rs. 38000 to 5000 per sq.m. The highest market land value is found near Bytco *Chowk* (Rs 38000 per sq.m.) followed by Deolali (Rs 30000 per sq.m.), Dasak (Rs 18000 per sq.m.), Samangaon , Vihitgaon and Chehedi (Rs 15000 per sq.m.) Panchak (Rs 12000 per sq.m.). The Table No. IV- XI and Fig. 4.28 give clear idea about the market land values of the Study division. The low market land values are found in Chadegaon (Rs 5000 per sq.m.) because these areas are outer part of the study division and study region which mainly falls in agriculture area.

In the Nashik Road Division , the Rent Values are ranging from Rs. 2500 to 800 per 100 sq. feet. The highest Rent Value has found near Chehedi Industrial Zone (Rs 2500 per 100 sq. feet.) followed by Panchak Industrial Zone (Rs 2000 per 100 sq. feet.), Deolali and Bytco *Chowk* area (Rs 1500 per 100 sq. feet.) Vihitgaon, Chehedi, Chadegaon Industrial Zone, Dasak (Rs 1200 per 100 sq. feet.), Panchak (Rs 900 per 100 sq. feet.). The Table No. IV- XI and Fig. 4.28 give clear idea about the market land values of the Study division. The low market land values has found in Chadegaon Residential area (Rs 800 per 100 sq. feet.) because these areas are outer side area of the study division and study region which mainly falls in agriculture area. The Table No. IV- XI and Fig. 4.28, Contour map 4.1, 4.2 and 4.3 give clear idea about the Assessd land values, Market land values and Rent values of the Nashik Road division.
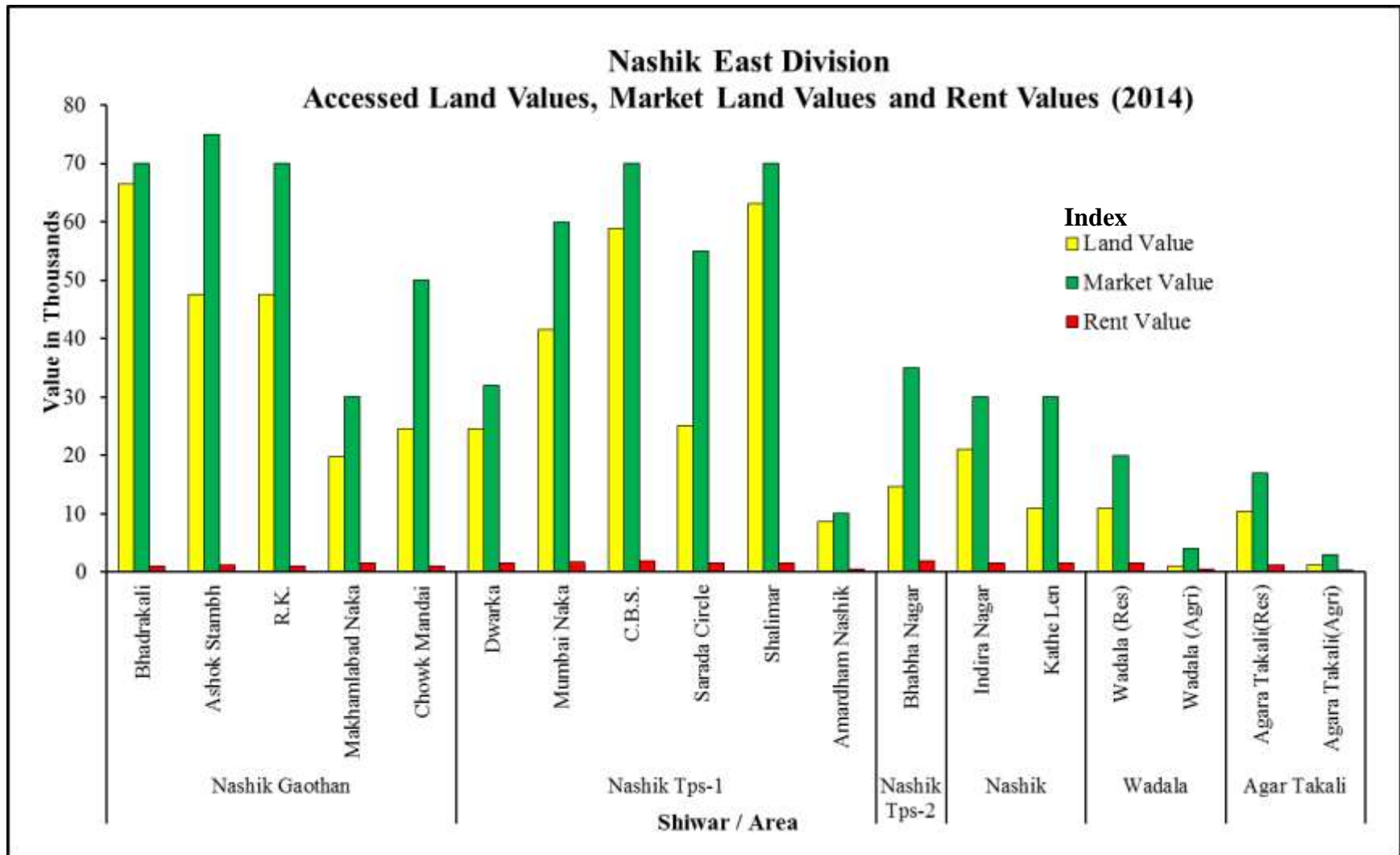
Fig. 4.28

NASHIK CITY: ACCESSED LAND VALUES, MARKET LAND VALUES

AND RENT VALUES (Per Sq. m) (2014)

SR.NO	SHIWAR	AREA	LAND VALUE	MARKET VALUE	RENT VALUE
		NASHIK WEST DIVISION (2014)			
1	NASHIK TPS-2	COLLEGE ROAD	63,100	1,00,000	2,500
2		GANGAPUR ROAD	49,200	80,000	2,200
3		MAHATMA NAGAR	49,200	80,000	2,100
4		SHARNPUR	39,700	70,000	2,000
5		TRIMBAK ROAD	55,300	70,000	2,000
6		CANARA CORNER	52,000	85,000	2,200
7		TILAK WADI	52,000	80,000	2,200
8		C.B.C	52,000	75,000	2,200
9		GADKARI *CHOWK*	52,000	70,000	2,050
10		MICO CIRCLE	43,200	75,000	2,150
11		SAMBHAJI *CHOWK*	43,200	72,000	2,050
12		ABB CIRCLE	43,200	65,000	1,900
13		ND.MVP. ENGG.COLLEGE	35,500	85,000	2,300
14		ASARAM BAPU ASHRAM	35,500	50,000	2,100
15	NASHIK	GOVIND NAGAR	14,000	35,000	2,000
		TOTAL	**6,79,100**	**10,92,000**	**31,950**

Source: 1) Ready Reckoner Book , Nashik city (2014)

2) Sub Registration office, Nashik West (2014)

It is observed from the Table No. IV-XII and Fig. 4.29 that the Assessed Land Values are higher near and along roads stretches from College Road to Gangapur Road to Mahatma Nagar to Canada Conner to C.B.S in Nashik West division which is part of Town Planning Scheme-2 area and Developed with proper planning and has high end amenities. The assessed land values ranges between

Rs.63100 per sq. mtrs. to Rs. 14000 per sq. mtrs. This has found highest near College Road area due to high commercial potential.

In the Nashik West Division , the Market Land values are ranging from Rs. 100000 to 35000 per sq.m The highest market land value has found near College Road (Rs 100000 per sq.m.) followed by Canada Corner and N.D.M.V.P. Engineering College area (Rs 85000 per sq.m.), Gangapur Road, Mahatma Nagar and Tilak Wadi (Rs 80000 per sq.m.), C.B.S and Mico Circle (Rs 75000 per sq.m.), Sharanpur, Trimbak Road, Gadakari *Chowk*, and Sambhaji *Chowk* (Rs 70000 per sq.m.), A.B.B Circle (Rs 65000 per sq.m.) and Asaram Bapu Ashram (Rs 50000 per sq.m.). The low market land values has found in Govind Nagar (Rs 35000 per sq.m.) because these areas are outside from C.B.D.

In the Nashik West Division, the Rent Values are ranging from Rs. 2500 to 1900 per 100 sq. feet. The highest Rent Value is near College Road (Rs 2500 per 100 sq. feet.) and in other area of the study division. It has found similar Rent Values i.e. near to Rs. 2200 per 100 sq. feet because all these area comes under Town Planning Scheme- 2 and have good high-end amenities. The Table No. IV-XII and Fig. 4.29 Contour map 4.1, 4.2 and 4.3give clear idea about the Assess Land values, Market land values and Rent values of the Nashik West division.

Fig. 4.29

TABLE NO.IV-XIII

NASHIK CITY: ACCESSED LAND VALUES, MARKET LAND VALUES

AND RENT VALUES (Per Sq. m) (2014)

	NEW NASHIK DIVISION (2014)				
SR.NO	SHIWAR	AREA	LAND VALUE	MARKET VALUE	RENT VALUE
1	NASHIK	UNTWADI	21,000	35,000	1,500
2		TRIMURTI *CHOWK*	16,300	32,000	1,450
3		CIDCO	4,800	12,000	800
4	KAMTHAWADA	KAMTHWADA GAON	12,000	25,000	1,300
5	AMBAD'	AMBAD GAON	10,000	20,000	1,200
6		AMBAD M.I.D.C (RES)	15,500	20,000	1,300
7		AMBAD M.I.D.C (COM)	23,300	25,000	3,000
8		AMBAD M.I.D.C (INDUSTRIAL)	10,400	30,000	5,000
9	PATHARDI	PATHARDI (RES)	13,500	20,000	1,300
10		PATHARDI (AGRI)	1,800	3,500	800
11	PIMPALAGAON KHAMB	PIMPALGAON KHAMB(RES)	1,600	8,000	700
12		PIMPALGAON KHAMB (AGRI)	1,000	4,000	500
13	VADNER	VADNER (RES)	1,300	8,000	600
14		VADNER (AGRI)	1,100	4,000	450
15	DADEGAON	DADEGAON (RES)	1,800	8,000	600
16		DADEGAON (AGRI)	900	4,000	475
		TOTAL	**1,36,300**	**2,78,500**	**16,050**

Source: 1) Ready Reckoner Book , Nashik city (2014)

2) Sub Registration office, New Nashik Division (2014)

It is observed from the Table No. IV-XIII and Fig. 4.30 that the Assessed Land Values are higher near and along roads stretches from Untwadi to Ambad M.I.D.C. It is the link road between residential and M.I.D.C. area. The assessed land values ranges between Rs.23000 per sq.m. to Rs. 1600 per sq. m. near Ambad M.I.D.C. area. The peripheral areas of New Nashik Division have low assessed land values. The assessed land values have showing decreasing trend from inner or core part to outer parts of the division.

In the New Nashik Division , the Market Land values are ranging from Rs. 35000 to 8000 per sq.m. The highest market land value has found near Untwadi (Rs 35000 per sq.m.) followed by Trimurti *Chowk* area (Rs 32000 per sq.m.), Ambad M.I.D.C. (Rs 30000 per sq.m.), Kamtwada, Ambad and Pathardi (Rs 20000 per sq.m.). The low market land values has found in Pimpalgaon Khamb, Vadner and Dadegaon (Rs 8000 per sq.m.) because these areas are mostly agriculture.

In the New Nashik Division , the Rent Values are ranging from Rs. 5000 to 600 per 100 sq. feet. The highest Rent Value has found near Ambad M.I.D.C (Rs 5000 per 100 sq. feet.) followed by Untwadi, Trimurti *Chowk*, Kamtwada, Ambad gaon and Pathardi areas (Rs 1500 to 1300 per 100 sq. feet.).The low Rent Values are found in Pimpalgaon Khamb, Vadner, Dadegaon (Rs 600 per 100 sq. feet.) because these areas are mostly agriculture zone. The Table No. IV-XIII and Fig. 4.30 Contour map 4.1,4.2 and 4.3 give clear idea about the Assess Land values, Market land values and Rent values of the New Nashik division.
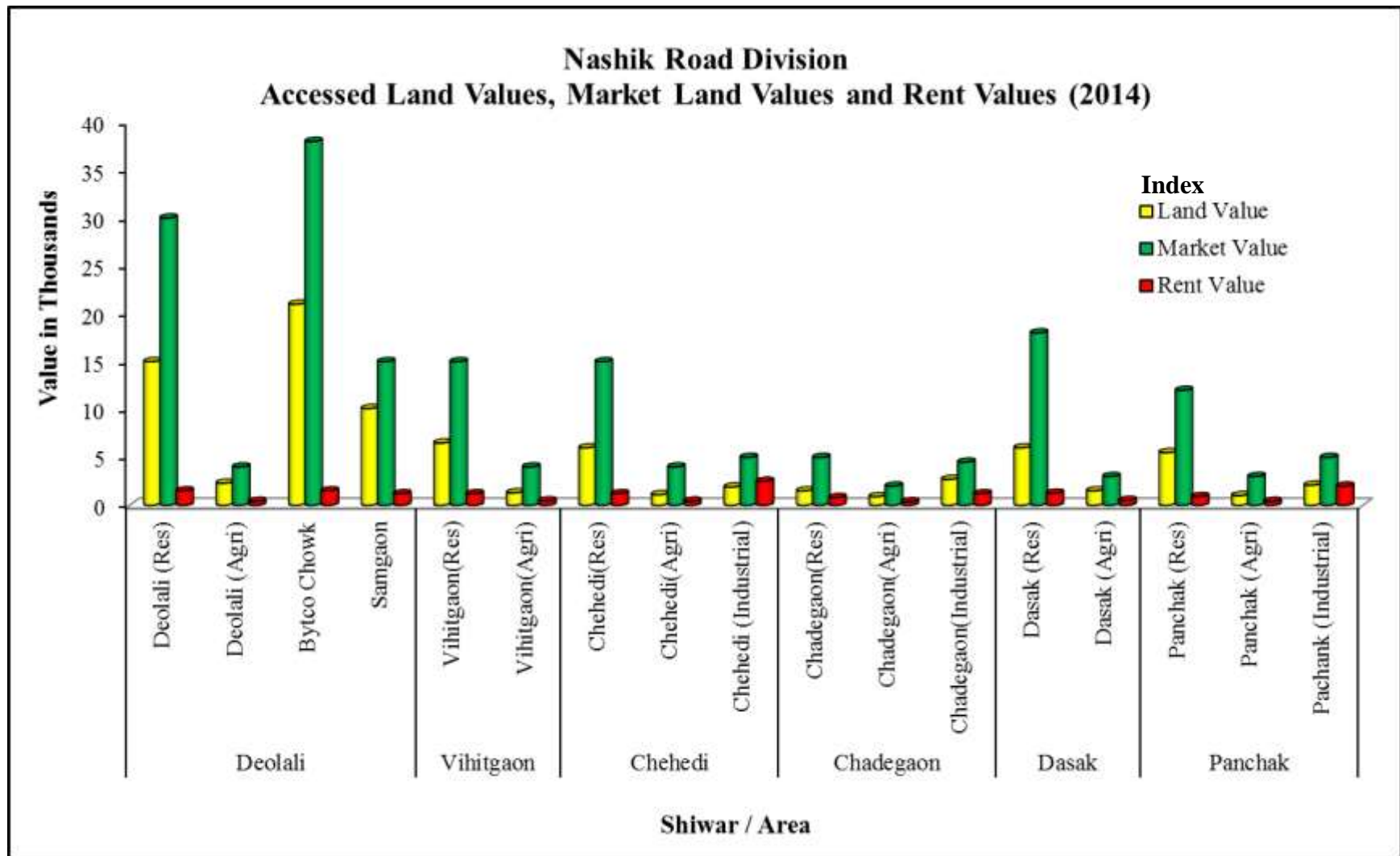
New Nashik Division
Accessed Land Values, Market Land Values and Rent Values (2014)

Fig. 4.30

TABLE NO. IV-XIV

NASHIK CITY: ACCESSED LAND VALUES, MARKET LAND VALUES

AND RENT VALUES (Per Sq. m) (2014)

PACHAVATI DIVISION (2014)					
SR.NO	**SHIWAR**	**AREA**	**LAND VALUE**	**MARKET VALUE**	**RENT VALUE**
1	NASHIK	PANCHAVATI DEPO	19,700	35,000	1,200
2		HIRAWADI	22,500	30,000	1,500
3		K.K.W. COLLEGE	22,500	30,000	1,500
4		MERI	12,500	25,000	1,200
5		BIDI KAMGAR NAGAR	14,600	22,000	1,100
6		PANCHAVATI KARANJA	32,300	40,000	1,000
7		NIMANI	33,700	40,000	1,000
8		R.T.O	19,000	23,000	1,100
9		HANUMAN WADI	12,100	30,000	1,500
10		JATRA HOTEL	18,700	25,000	1,200
11		MEDICAL COLLEGE	13,500	22,000	1,200
12		CANAL SHIV ROAD (24 M.)	16,000	20,000	1,100
13		NASHIK (AGRI)	1,800	7,500	700
14	ADGAON	ADGAON (AGRI)	1,820	5,000	500
15	MHASHRUL	MHASRUL GAON (RES)	6,000	12,000	800
16		MHASRUL GAON (AGRI)	1,200	3,500	500
17	MAKHAMLABAD	MAKHAMLABAD (RES)	10,000	25,000	1,000
18		MAKHAMLABAD(AGRI)	3,500	6,000	600
19	MANUR	MANUR (RES)	7,500	12,000	700
20		MANUR (AGRI)	650	3,000	500
21	NANDUR DASAK	NANDUR DASAK (RES)	8,000	15,000	1,000
22		NANDUR DASAK (AGRI)	1,100	5,000	800
		TOTAL	**2,78,670**	**4,36,000**	**21,700**

Source: 1) Ready Reckoner Book , Nashik city (2014)

2) Sub Registration office, Panchavati (2014)

It is observed from the Table No. IV-XIV and Fig. 4.31 that the assessed land values range between from Rs.33700 per sq. m. to Rs. 7500 per sq.m. It is found near Nimani and Panchavati Karanja area which is the old CBD of the Nashik city, so the assessed land values are higher than of the other part of the Study Division. The peripheral areas of the Panchavati Division have low assessed land values. The assessed land values have shown decreasing trend from inner or core part to outer parts of the division.

In the Panchavati Division , the Market Land values are ranging from Rs. 40000 to 12000 per sq.m. The highest Market Land Value is found near Panchavati Karanja and Nimani (Rs 40000 per sq.m.) followed by Panchavati Depot, Hirawadi, K.K.W, Meri, Makhamalbad, Jatra Hotel and Hanumanwadi area (Rs 30000 to 25000 per sq.m.), R.T.O. ,Medical College and Canal shiv Road (Rs 22000 to 20000 per sq.m.), Nandur Dasak (Rs 15000 per sq.m.). The low Market Land Values has found in Manur and Mhasrul gaon (Rs 12000 per sq.m.) because these areas are outer part of study division and study region also.

In the Panchavati Division , the Rent Values are ranging from Rs. 1500 to 700 per 100 sq. feet. The highest Rent Value is found near Hirawadi, Hanumanwadi and K.K.W. College (Rs 1500 per 100 sq. feet.) and in the other area of study division it is found similar Rent Values i.e. from Rs 1200 to 1000 per 100 sq. feet. because these all area have developed similarly and has same public amenities. The low Rent Values has been found in Mhasrul and Manur (Rs 700 per 100 sq. feet.) because these areas are outer part of the study division and study region also. The Table No. IV-XIV andFig. 4.31 Contour map 4.1,4.2 and 4.3 gives clear idea about the Assess Land values, Market land values and Rent values of the Panchavati division.
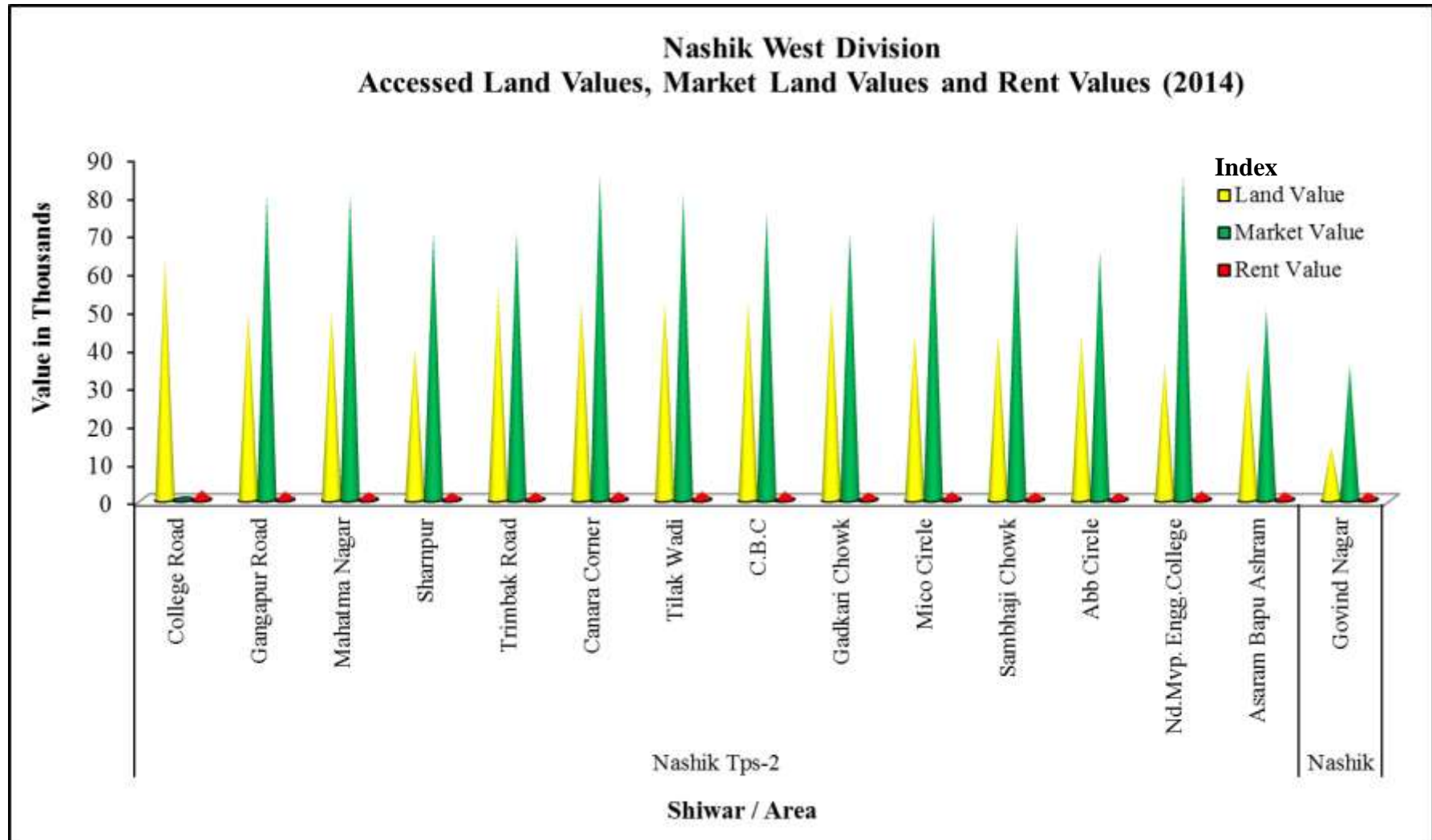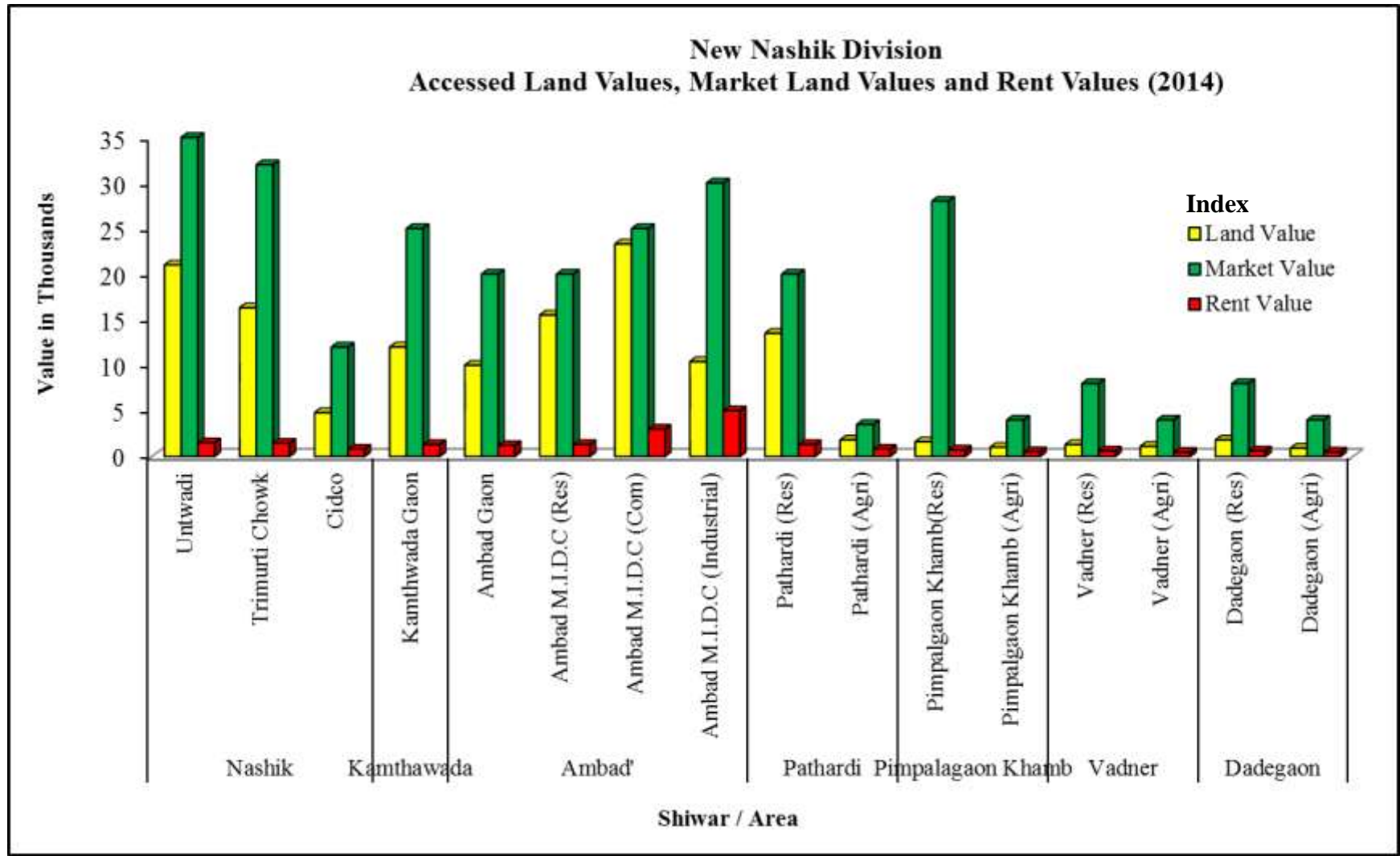
Fig. 4.31

TABLE NO. IV-XV

NASHIK CITY: ACCESSED LAND VALUES, MARKET LAND VALUES

AND RENT VALUES (Per Sq. m) (2014)

SR.NO	SHIWAR	AREA	LAND VALUE	MARKET VALUE	RENT VALUE
SATPUR DIVISION (2014)					
1	SATPUR	I.T.I	10,100	30,000	1,200
2		SHIVAJI NAGAR	5,000	25,000	1,000
3		ASHOK NAGAR	13,000	25,000	1,000
4		SATPUR (AGRI)	1,320	3,000	500
5		SATPUR (RES)	12,200	25,000	1,100
6		SATPUR M.I.D.C (COM)	18,300	30,000	3,000
7		SATPUR M.I.D.C (INDUSTRIAL)	8,200	16,000	5,000
8	PIMPALGAON BAHULA	PIMPALGAON BAHULA(RES)	3,500	10,000	800
9		PIMPALGAON BAHULA (AGRI)	1,700	3,000	500
10	GANGAPUR	GANGAPUR(RES)	11,000	25,000	1,000
11		GANGAPUR (AGRI)	5,200	7,500	800
12	ANANDWALI	ANANDWALI (RES)	25,000	35,000	1,200
13		ANANDWALI (AGRI)	6,200	8,000	800
14	CHUNCHALE	CHUNCHALE (RES)	10,000	15,000	800
15		CHUNCHALE (AGRI)	2,000	3,500	500
		TOTAL	**1,32,720**	**2,61,000**	**19,200**

Source: 1)Ready Reckoner Book , Nashik city (2014)

2) Sub Registration office, Nashik West (2014)

It is observed from the Table No. IV-XV and Fig. 4.32 that the Assessed Land Values are higher near and along roads stretches from Satpur to Satpur M.I.D.C. to Ashok Nagar to Gangapur Road to Anandwali in Satpur Division which is main traffic road of the division. The assessed land values range between Rs.25000 per sq.m. to Rs. 5000 per sq.m. Which is found more near Anandwali area because this area is newly developed area adjacent to Town Planning Scheme – 2 with high-end amenities so the assessed land values are higher than of the other areas of the Study Division. The peripheral areas of the Satpur Division have low assessed land values. The assessed land value has shown decreasing trend from inner or core part to outer parts of the division.

In the Satpur Division , the Market Land values are ranging from Rs. 35000 to 10000 per sq.m. The highest market land value has been found near Anandwali (Rs 35000 per sq.m.) followed by Satpur M.I.D.C area (Rs 30000 per sq.m.) Satpur, Ashok Nagar, Shivaji Nagar, and Gangapur (Rs 25000 per sq.m.), Chunchale (Rs 15000 per sq.m). The low market land values have been found in Pimpalgaon bahula (Rs 10000 per sq.m.) because these areas are mostly comes under agriculture zone.

In the Satpur Division , the Rent Values are ranging from Rs. 5000 to 800 per 100 sq. feet. The highest Rent Value has been found near Satpur M.I.D.C (Rs 5000 per 100 sq. feet.) followed by Anandwali (Rs 1200 per 100 sq. feet.) And in other area of study division it has been found similar Rent Values i.e. near to Rs 1000 per 100 sq. feet. because these all area are developed similarly and have same public amenities. The low Rent Values has been found in Pimpalgaon Bahula and Chunchale (Rs 800 per 100 sq. feet.) because these areas are mostly comes uder agriculture zone and the outer part of the study division and also study region. The Table No. IV-XV and Fig. 4.32 Contour map 4.1,4.2 and 4.3 give clear idea about the Assess Land values, Market land values and Rent values of the Satpur division.

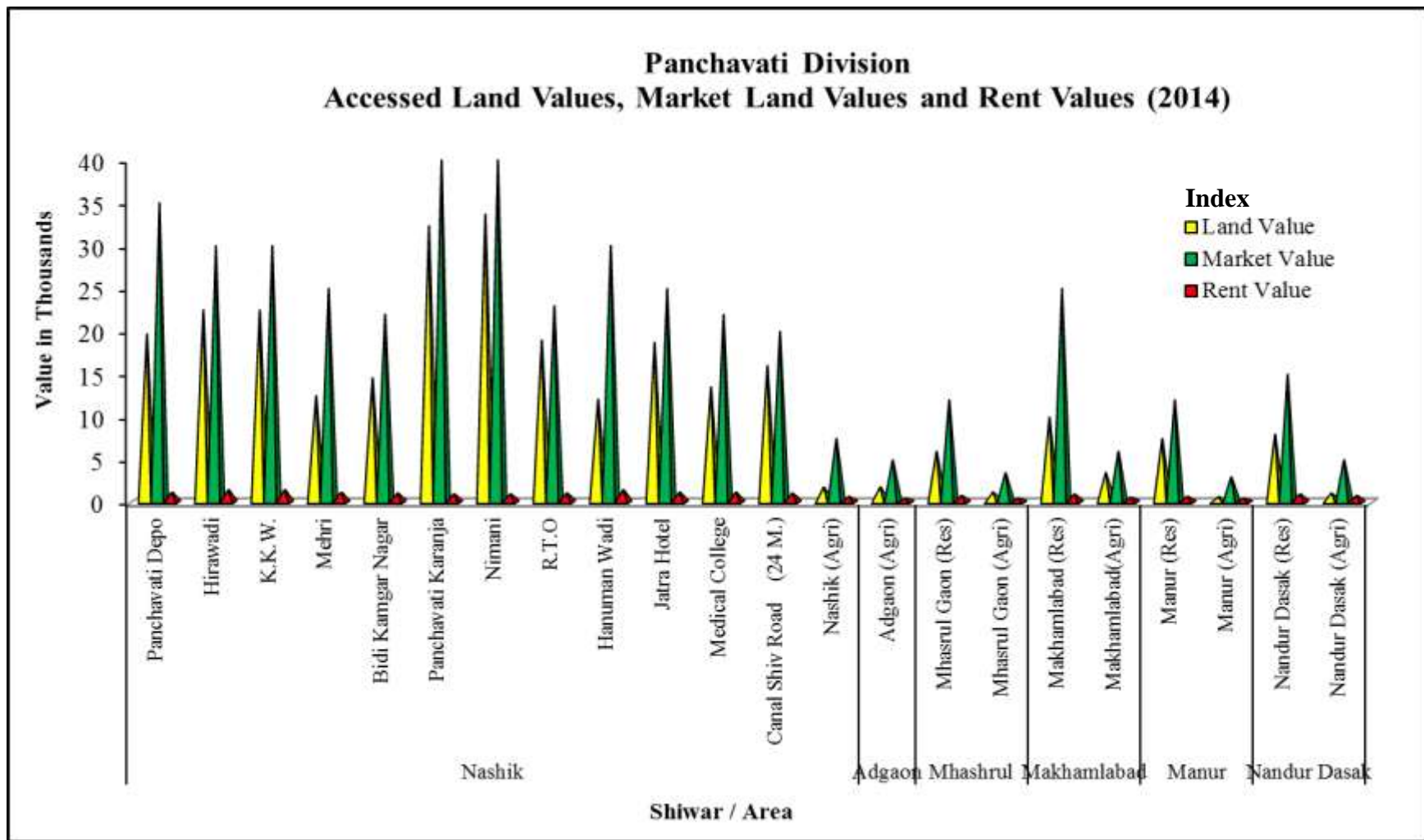**Fig. 4.32**

Land Values

Nashik Municipal Corporation (NMC)

Makhmalabad   Mhasrul

Jatra Hotel

Hanumanwadi
Canal Shiv Road K K Wagh
Anandwalli   Ashokstambha
Shivajinagar   College Road   Panchvati Depot
Canara corner   C B S
MICo Circle   ShalimarDwarka
Ashoknagar Satpur   Untwadi   Nandur Dasak Manur
                Bhabanagar   Dasak
            Mumbai Naka
                Indranagar Kathe lane
        Kamathwadi
Chunchale   Wadala
    Ambadgaon

Bytcho Point
Chadegaon
Pathardigaon   Deolali
                Vihitgaon
            Vadner
    Dadhegaon

Legend

——	< 5000
——	10000 - 15000
——	15000 - 20000
——	20000 - 25000
——	25000 - 30000
——	30000 - 35000
——	35000 - 40000
——	> 40000

N
W   E
S

0   1.5   3 Km.

CONTOUR MAP 4.1

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Market Values

Nashik Municipal Corporation (NMC)

Makhmalabad Mhasrul

Jatra Hotel

Hanumanwadi

Anandwalli Canal Shiv Road K K Wagh

Shivajinagar Ashokstambha

College Road C.B.S Panchvati Depot

Canara corner

MICo Circle ShalimarDwarka

Ashoknagar Satpur Untwadi Nandur Dasak Manur

Mumbai Naka Bhabanagar

Indiranagar Kathe lane Dasak

Kamathwadi

Wadala

Chunchale

Ambadgaon

Bytcho Point

Chadegaon

Pathardigaon Deolali

Vihitgaon

Vadner

Dadhegaon

N
W E
S

0 1.5 3 Km.

Legend

< 10000
10000 - 15000
15000 - 20000
20000 - 25000
25000 - 30000
30000 - 35000
35000 - 40000
> 40000

CONTOUR MAP 4.2

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Rent Values

Nashik Municipal Corporation (NMC)

Makhmalabad   Mhasrul

Jatra Hotel

Hanumanwadi

Anandwalli   Canal Shiv Road K K Wagh

Shivajinagar   Ashokstambha

College Road   Panchvati Depot

Canara corner   C.B.S.

I.T.I.   MICo Circle   ShalimarDwarka

Ashoknagar Satpur   Untwadi   Nandur Dasak Manur

Mumbai Naka   Bhabanagar

Indiranagar Kathe lane   Dasak

Kamathwadi

Wadala

Chunchale

Ambadgaon

Bytcho Point
Chadegaon

Pathardigaon   Deolali
Vihitgaon

Vadner

Dadhegaon

Legend

— < 900

— 900 - 1200

— 1200 - 1500

— 1500 - 1800

— 1800 - 2100

— > 2100

CONTOUR MAP 4.3

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4.25   NEW METHODS OF DELIMITING THE CBD:-

Here, an attempt has been made to delimitate the CBD of Nashik city by taking few indices, which are completely different from other investigators, so this is a new approach towards the study of the delimitation of CBD. In this method the following new indices have been use.

1. STD booths, local telephones and coin boxes.
2. Fax and mobile shopping centers.
3. Computer training centers, internet centers and no. of computers.
4. Xerox centers.
5. Bus stands.
6. Rickshaw stops.
7. Banks.
8. Insurance offices.

4.25.1 STD AND LOCAL TELEPHONE BOOTH CENTERS:-

STD means subscriber trunk dialing (telephone) and ISD means international subscriber dialing. The telephone service, it may be STD, ISD or local, which is for the purpose of communication. So where the concentration of commercial activities is more, the density of STD booth also observed more. Now-a-days the STD booth centers are mainly observed in most populated and economically developed areas.

In the Study region, the division-wise analysis has been done. It is observed that the Panchavati division has the highest (20.81 percent) concentration of STD and local telephone booth centers followed by Nashik East division (20.30 percent) and Nashik Road division (17.77 percent). It means that nearly 58.88 percent of STD booth centers are concentrated in these three divisions. The Nashik West, New Nashik and Satpur division have low concentration of STD booths, i.e. 12.69 percent, 13.71 percent and 14.72 percent respectively. The Table No. IV-XVI and Fig. 4.33 give clear idea about the division-wise distribution of STD booth centers and their concentration.

4.25.2 COIN BOX CENTERS:-

Now-a-days, the coin-box telephone service is available everywhere and available for twenty four hours. This is an important service for people to communicate within in the state. Most of the shopping centers and residential people provide this facility to the people. So the coin-box facility is a common one as compared to other amenities of communication.

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The concentration of coin-boxes amenities has found in the Nashik East, Nashik Road and Panchavati division with percentage 23.42, 20.27 and 21.17 respectively. These three divisions, together account for 64.86 percent of the total coin-box centers in the Study region. The low concentration of coin-box centers are observed in Nashik West, New Nashik and Satpur division i.e. 13.97 percent, 11.72 percent and 9.45 percent respectively. These three divisions have least coin box centers because Nashik west division has well developed residential society while New Nashik and Satpur part have covered mostly by M.I.D.C. The Table No. IV-XVI and Fig. 4.33 show the division-wise concentration of the coin-box centers in the Nashik city.

4.25.3 FAX CENTERS AND MOBILE SHOPPING CENTERS:-

There are 75 fax centers which are unevenly distributed in the Study region. The high concentration of fax centers is observed in the New Nashik, Panchavati and Satpur division where 18.67 percent, 20.00 percent and 20.00 percent of the total fax Centers are found respectively. These three divisions together account nearly 58.67 percent fax centers of the Study region. The low concentration is observed in the Nashik East, Nashik Road and Nashik Road division has 10, 13 and 8 fax centers respectively. There are 131 mobile shopping centers in the study region. It is observed that Nashik East and New Nashik division have 25.19 percent and 25.95 percent mobile shops respectively. These two divisions have higher concentration account nearly 51.14 percent mobile shops because these divisions are located near C.B.S and M.I.D.C area respectively which is also the main commercial area of the Nashik city. The low concentration of mobile shopping centers is observed in the Nashik Road, Nashik West Panchavati and Satpur division. The Table No. IV-XVI and Fig. 4.33 shows the division-wise concentration of fax-centers and mobile shopping centers of the Study region.

TABLE NO. IV-XVI

NASHIK CITY: DIVISIONWISE DISTRIBUTION OF STD/LOCAL

TELEPHONES, COIN-BOX, FAX AND MOBILE SHOPPING CENTERS

(2014)

SR. NO.	DIVISION	STD/LOCAL TELEPHONE CENTERS	COIN-BOX CENTERS	FAX CENTERS	MOBILE SHOPPING CENTERS
1	NASHIK EAST	200	260	10	33
	%	20.30 %	23.42 %	13.33 %	25.19 %
2	NASHIK ROAD	175	225	13	17
	%	17.77 %	20.27 %	17.33 %	12.98 %
3	NASHIK WEST	125	155	8	12
	%	12.69 %	13.97%	10.67 %	9.16 %
4	NEW NASHIK	135	130	14	34
	%	13.71 %	11.72 %	18.67 %	25.95 %
5	PACHAVATI	205	235	15	15
	%	20.81 %	21.17 %	20 %	11.45 %
6	SATPUR	145	105	15	20
	%	14.72 %	9.45 %	20 %	15.27 %
	TOTAL	**985**	**1110**	**75**	**131**
	%	**100%**	**100%**	**100%**	**100%**

Source: 1) Shop act License office, Nashik City.

2) Telephone office, Nashik City.

Nashik city: Division wise Distribution of STD/Local Telephones, Coin-Box, Fax and Mobile Shopping Centers (2014)
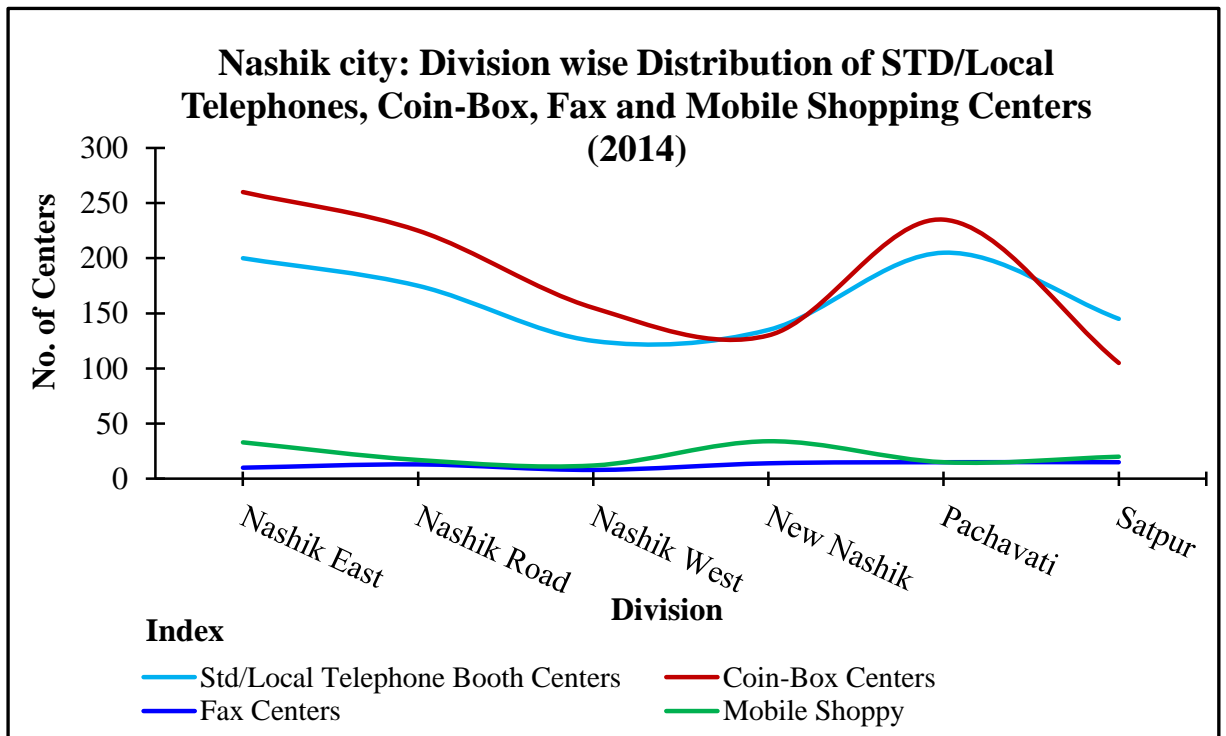
Fig. 4.33

4.25.4 COMPUTER TRAINING CENTERS AND NUMBER OF COMPUTERS:-

In the study region total 111 computer training centers are observed. The maximum number of computer training centers (25) is observed in Nashik West division. The Nashik Road division has 22 computer training centers. The Nashik Road division includes the area of Nashik road railway station and Nashik West division includes many colleges. There are many government offices, so there are more computer training centers. The Nashik East (17), New Nashik (14), Panchavati(15) and Satpur (18) have less number of computer training centers.

There are near about 1005 computers in the various computers training centers, but the division-wise distribution shows a different picture. Maximum number of computers (225) is found in Nashik West division followed by New Nashik (210), Nashik Road (195), Nashik East (145) and Satpur (135). The Panchavati division (95) has less number of computers. These divisions cover the C.B.S, Nashik road railway station, many schools and colleges of the study region.

Division-wise computer training centers and number of computers in the study region show a positive co-relationship. It means that the division which has

more computer training centers has more number of computers. Table No. IV-XVII and Fig. 4.34 shows the computer training centers and number of computers in different divisions of the study region.

TABLE NO. IV-XVII

NASHIK CITY: DIVISIONWISE DISTRIBUTION OF COMPUTER TRAINING CENTERS AND NO. OF COMPUTERS, (2014)

SR. NO	DIVISION	COMPUTER TRAINING CENTERS	NO.OF COMPUTERS
1	NASHIK EAST	17	145
	%	15.32 %	14.42 %
2	NASHIK ROAD	22	195
	%	19.82 %	19.40 %
3	NASHIK WEST	25	225
	%	22.52 %	22.40 %
4	NEW NASHIK	14	210
	%	12.61 %	20.90 %
5	PACHAVATI	15	95
	%	13.51 %	9.45 %
6	SATPUR	18	135
	%	16.22 %	13.43 %
	TOTAL	**111**	**1005**
	%	**(100.00)**	**(100.00)**

Source: 1) Shop act License office, Nashik City.

Nashik city: Division wise Distribution of Computer Training Centers and No. of Computers (2014)
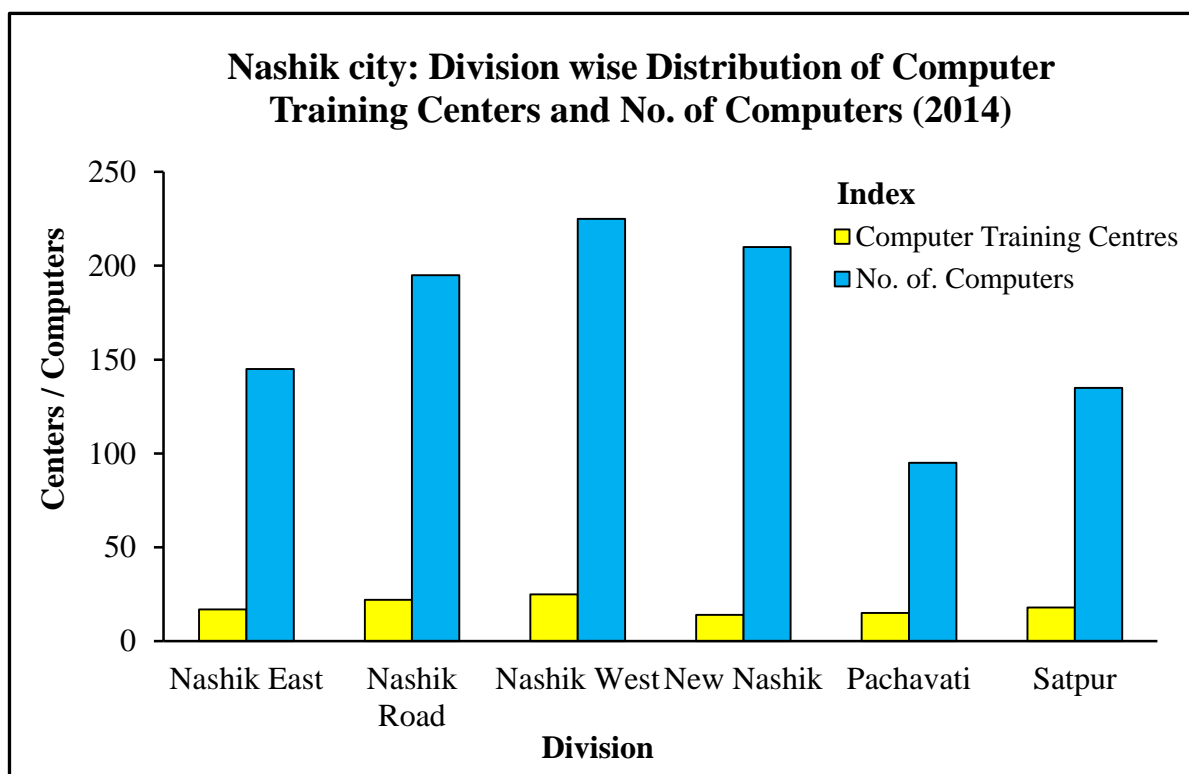
Fig. 4.34

4.25.5 INTERNET CAFE AND XEROX CENTERS:-

In the study region 280 internet cafes are observed. The highest concentration (23.22 percent) of internet café has been found in Nashik West division followed by Panchavati division (17.86percent) and Nashik Road division (16.08percent). These three divisions together account 57.16 percent of the total internet cafes in the study region. The Nashik East, New Nashik and Satpur division have each internet cafe 40in study region. The Nashik West division and Panchavati division cover C.B.S and educational institutes. The Nashik Road division cover Nashik road railway stations Area, So more concentration of internet cafes found in these 3 divisions. The other division has low concentration of internet cafes.

The Xerox center is the one of the important indicators to delimit the CBD. There are more Xerox centers where the concentration of administrative, banking amenities and commercial activities are observed. In the study region 494 Xerox centers are observed. Higher concentration of Xerox centers has observed in the Nashik West division (22.27percent), Nashik Road (20.04percent) and Nashik East (18.22percent). These three division account together 60.53 percent Xerox centers of the study region. This division covers C.B.S where various administrative offices

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such as Tehsil office, PWD office, NIMA office, collector's office, district court, Zillah perished and educational institutions etc. are located.

The Nashik Road and Nashik West division is located in the central part of the city: so more number of Xerox centers are also observed. These two divisions have 22.27percent and 20.04percent Xerox centers of the Study region. The New Nashik, Panchavati and Satpur division have 12.15, 13.15 and 14.17 per cent Xerox centers respectively. These divisions have less percentage because these are located on the periphery of the Study region. The Table No. IV-XVIII and Fig. 4.35 show the division-wise distribution of internet cafes and Xerox centers of the Study region.

TABLE NO. IV-XVIII

NASHIK CITY: DIVISIONWISE DISTRIBUTION OF INTERNET CAFES AND XEROX CENTERS (2014)

SR.NO.	DIVISION	INTERNET CAFE	XEROX CENTERS
1	NASHIK EAST	40	90
	%	14.28 %	18.22 %
2	NASHIK ROAD	45	99
	%	16.08 %	20.04 %
3	NASHIK WEST	65	110
	%	23.22 %	22.27 %
4	NEW NASHIK	40	60
	%	14.28 %	12.15 %
5	PACHAVATI	50	65
	%	17.86 %	13.15 %
6	SATPUR	40	70
	%	14.28 %	14.17 %
	TOTAL	**280**	**494**
	%	**(100.00)**	**(100.00)**

Source: 1) Shop act License office, Nashik City

Nashik city: Division wise Distribution of Internet Cafes and Xerox Centers (2014)
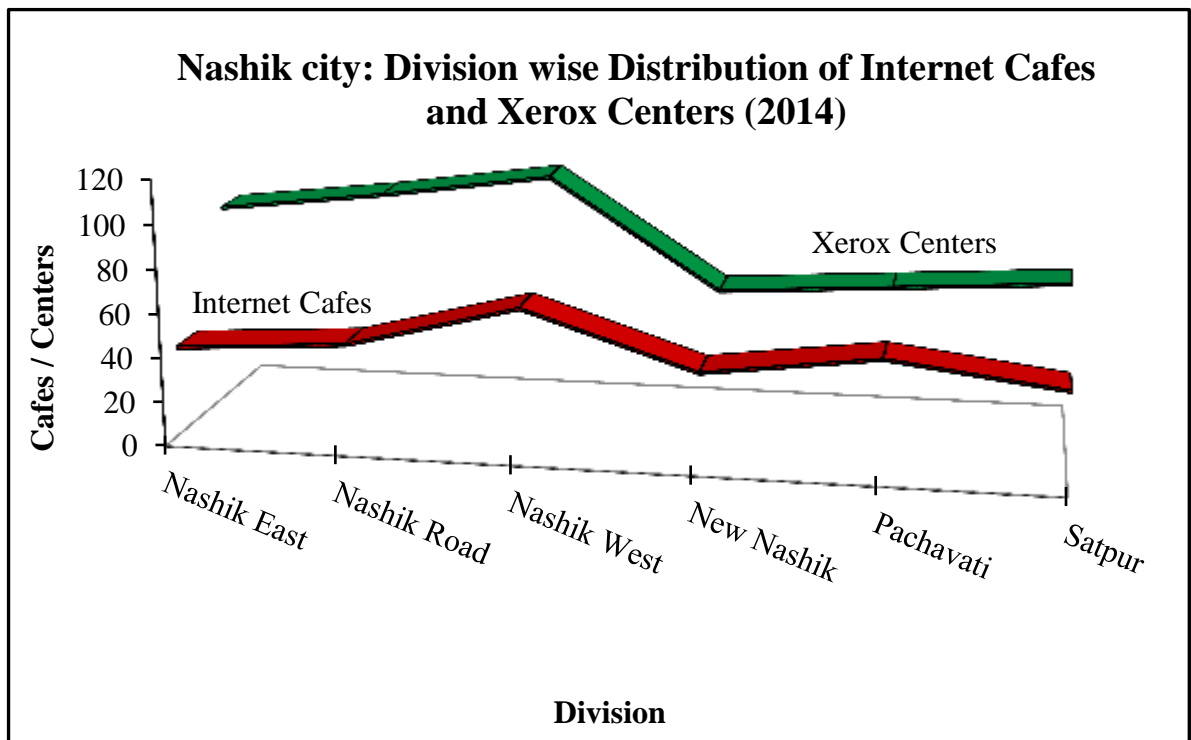
Fig. 4.35

4.25.6 CITY BUS, RICKSHAWS AND THEIR STOPS:-

City bus and rickshaw stop have been taken as indicators for delimiting the CBD, because the movement of the people for the purpose business and mainly for the office work have been considered, so the amenities of buses and rickshaws with their stops have been studied with their numbers. The division-wise data has been collected and analyzed.

72 bus stands are observed In the study region. Number of bus stands varies from division to division. The maximum number of bus stands has been found in the Nashik Road, New Nashik and Satpur division i.e. 18 each. These three divisions account together 75 percent bus stands followed by Nashik East (4), Nashik West (2), and Panchavati (12). These bus stands are located near C.B.S, M.I.D.C, school and colleges of the study region. In the study region 1610 no. of buses flow is observed. The maximum no. of buses are observed in Nashik Road (569), New Nashik (345), Panchavati (337) and these three divisions account together 77.71 percent of buses. The Nashik East, Nashik West and Satpur division have less buses i.e. 22.29 percent of total buses. (Table No. IV-XIX).

There are 242 rickshaw stops within limit of study region having 2180 rickshaws. The large number of rickshaws stops has been found in the Nashik East, Nashik Road and Nashik West division account together more than 55.74 percent

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rickshaw stops of the study region. The New Nashik, Panchavati and Satpur division have 44.26 percent rickshaw stops in study regions.

The divisions which cover area of C.B.S, Nashik road railway station have more number of rickshaw stops and more number of rickshaws. For example Nashik road division area like Deolali camp, Jail road, Nashik road, Bytco point, and Upanagar etc. have been coverd more number of rickshaw stops and more number of rickshaws. The other divisions which have covered area of Nashik West, Nashik East and C.B.S have more number of rickshaw stops with more number of rickshaws. The Table No.IV-XIX and Fig. 4.36 show the division-wise distribution of city bus and rickshaw stops in the study region.

TABLE NO. IV-XIX

NASHIK CITY: DIVISIONWISE DISTRIBUTION OF BUS STOPS, BUSES, RICKSHAW STOPS AND RICKSHAWS (2014)

SR. NO	DIVISION	NO.OF BUS STOP	NO. OF BUSES	NO. OF RICKSHAW STOP	NO. OF RICKSHAW
1	NASHIK EAST	4	78	56	361
	%	5.56 %	4.84 %	23.14 %	16.56%
2	NASHIK ROAD	18	569	45	466
	%	25.00 %	35.34 %	18.60 %	21.38 %
3	NASHIK WEST	2	43	38	388
	%	2.77 %	2.67 %	15.70 %	17.80 %
4	NEW NASHIK	18	345	36	365
	%	25.00 %	21.43 %	14.88 %	16.74 %
5	PACHAVATI	12	337	44	385
	%	16.67 %	20.94 %	18.18 %	17.66 %
6	SATPUR	18	238	23	215
	%	25.00 %	14.78 %	9.50 %	9.86 %
	TOTAL	**72**	**1610**	**242**	**2180**
	%	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**

Source: 1) Traffic Office, Nashik city (2014)

Nashik city : Division wise Distribution of Bus stops, Buses, Rickshaw Stops and Rickshaws (2014)
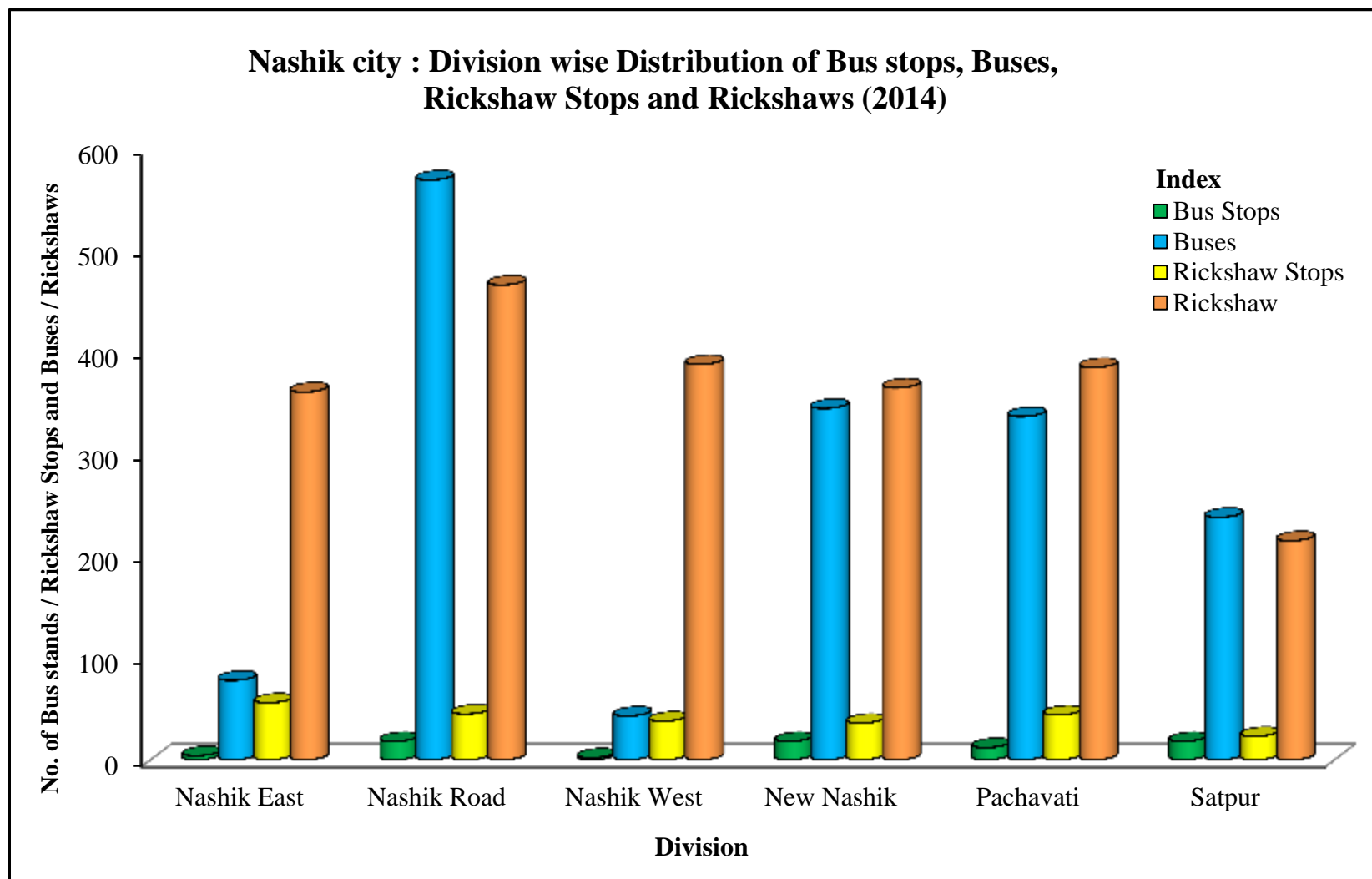
Fig 4.36

4.25.7 BANKS AND INSURANCE OFFICES:-

Bank and insurance offices are the important indicators of the economic or commercial activities of the people so these indicators have been taken into consideration for delimiting the CBD of the Nashik city.

In the study region, there are 129 nationalized banks but their distribution is uneven. The Nashik West division has maximum number (30) of banks while Nashik Road and Satpur division have 25 banks and 26 banks respectively. These three divisions account together 62.80 percent of total nationalized bank of the Nashik city. These three divisions cover the area of C.B.S where various administrative offices such as Tehsil office, PWD office, NIMA office, Collector's Office, District Court, Zillah Perished and educational institutions etc. are located. The Nashik East, New Nashik and Panchavati division have 12, 22, and 14 nos. of nationalized banks respectively and these 3 divisions account together 37.2 percent of total percentage.

In the study region 216 co-operative banks are observed. The co-operative banks are highly located in the Nashik East, Panchavati and Satpur division these 3 divisions account together 58.34 per cent co-operative banks of the study region. The Nashik Road, Nashik West and New Nashik division account together 41.66 percent co-operative bank. Co-operative banks are mainly located in the central part of the city and around the C.B.S, R.K and residential area adjacent to M.I.D.C, Satpur.

Nashik city, being a district headquarters has number of path-paddies or pat-sansthas. There are nearly 127 path-sansthas in the study region. The concentration of path-sansthas is observed in the Nashik East, New Nashik and Satpur division these three divisions account together 62.98 percent of total percentage. The Nashik Road, New Nashik and Satpur division has 11.83, 9.44, and 15.75 percent path-paddies respectively.

There are two types of insurance offices in the study region, i.e. life insurance and general insurance. In the study region, there are 131 life insurance offices, mainly observed in the Nashik Road and Nashik West division. These two divisions account together 61.83 percent of life insurance offices. The Nashik East, New Nashik, Panchavati and Satpur division have 12,8,13 and 17 life insurance offices and having 9.16, 6.11, 9.92, and 12.98 percent respectively.

in the study region 95 general insurance offices are observed, the Nashik Road and Nashik West division these two divisions account together 67.37 percent of total general insurance offices while Nashik East, New Nashik, Panchavati and

Satpur division have 8, 5, 8, 10 and these 4 divisions account together 32.63 percent general insurance offices respectively.

It has observed that all types of functions are concentrated in Nashik Road and Nashik West division. It means that the Nashik road railway station in Nashik road division and C.B.S in Nashik west division with its surrounding area has got more importance because of more concentration of administrative services and commercial activities. The Nashik road railway station in Nashik road division and C.B.S in Nashik west division with its surrounding area is the CBD of the Nashik city. The Table No. IV-XX and Fig. 4.37 and Fig. 4.38 shows the division wise distribution of various banks, path sansthas and insurance offices.

TABLE NO. IV-XX

NASHIK CITY: DIVISIONWISE DISTRIBUSTION OF BANKS AND INSURANCE OFFICES (2014)

SR. NO	DIVISION	NATIONAL BANKS	CO-OPERATIVE BANKS	PATH SANSTHA OR PEDHIES	INSURANCE OFFICE	
					GENERAL	LIFE
1	NASHIK EAST	12	48	28	08	12
	%	9.30 %	22.22 %	22.04 %	8.42 %	9.16 %
2	NASHIK ROAD	25	30	15	22	27
	%	19.38 %	13.88 %	11.83 %	23.16 %	20.61 %
3	NASHIK WEST	30	25	12	42	54
	%	23.26 %	11.58 %	9.44 %	44.21 %	41.22 %
4	NEW NASHIK	22	35	28	05	08
	%	17.05 %	16.20 %	22.04 %	5.26 %	6.11%
5	PACHAVATI	14	38	24	08	13
	%	10.88 %	17.60 %	18.90 %	8.42 %	9.92 %
6	SATPUR	26	40	20	10	17
	%	20.16 %	18.52 %	15.75	10.53%	12.98 %
	TOTAL	**129**	**216**	**127**	**95**	**131**
	%	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**

Source: 1) All Bank Head Offices, Nashik city (2014).

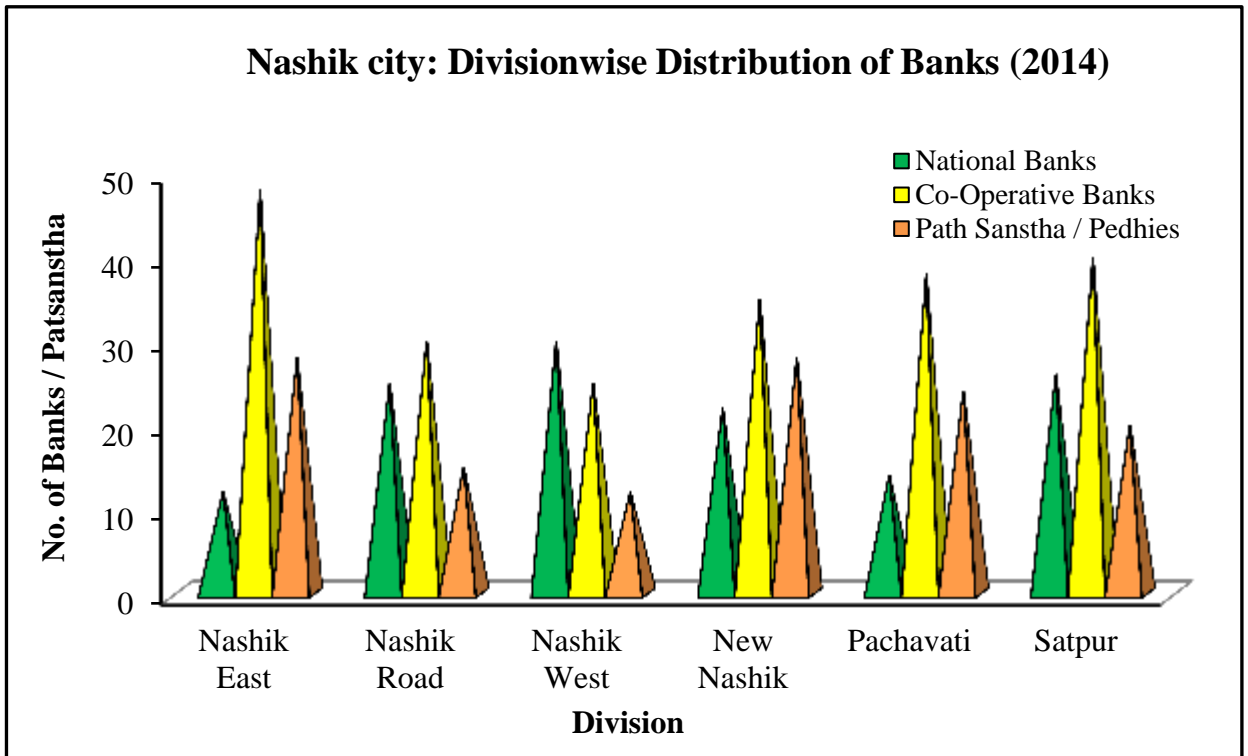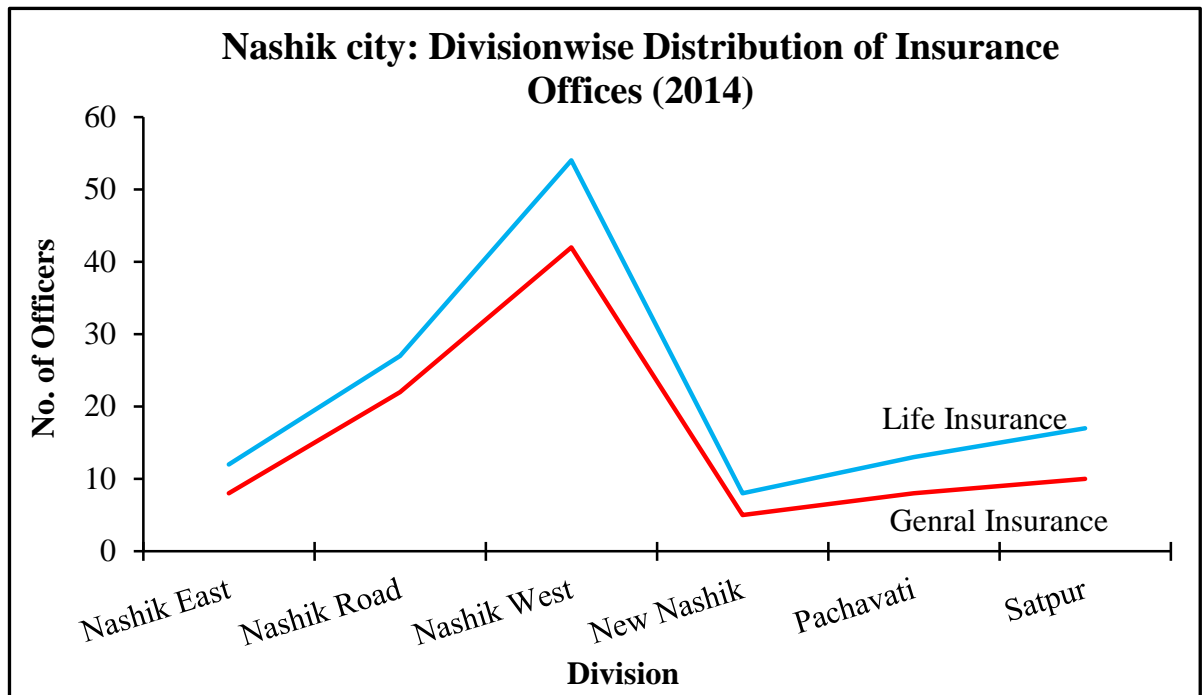2) All Insurance Head Offices, Nashik city (2014).

Fig. 4.37

Fig. 4.38

4.26 NASHIK CITY: HEALTH AMENITIES DIVISION WISE DISTRIBUTION OF POPULATION, DISPENSARIES, HOSPITALS AND DOCTORS:

Healthcare is the most important considerable factor for development of that country. A poor economy of country can't provide a better health to their population. In western developed countries the solutions for the most deadly diseases are sorted out with many researches. The research needs money to find out solution. So in other words we can say that better health care amenities shows better economy of that region. Now a days India and Brazil are under developed countries which established a good set up for health care especially in urban areas.

As the resident of city is healthy then he may provide healthy future to the city. Also it is helpful to build economy by doing health care so it is very essential for every city resident to care about self-health as well as its family health. So to achieve good health lectures on health should be attained with families.

In urban or rural urban areas the future of nation are learned in the school. So the teacher plays an important role to teach the students about the health as well as healthy life style. It is necessary to maintain the physical and mental balance of student's.

In the present study I would like to show the available health amenities in the study area. As discussed earlier, health amenities means health care center establishment in study area. It shows the health of resident as well as economy of the study area. The Table No.IV-XXI and Fig. 4.39 shows the division wise distribution of Population, Dispensaries, Hospitals and Doctors.

TABLE NO. IV-XXI

NASHIK CITY: DIVISION WISE POPULATION, NO.OF. DISPENSARIES,

NO. OF HOSPITALS AND NO. OF DOCTORS (2014)

SR. NO	DIVISION	POPULATION	NO. OF. HOSPITALS	% TO TOTAL	NO.OF. DISPENSARIES	% TO TOTAL	NO.OF. DOCTORS	% TO TOTAL	DOCTOR PATIENT RATIO
1	NASHIK EAST	2,37,660	65	10.33	595	13.16	695	12.62	342
2	NASHIK WEST	1,83,813	67	10.65	435	9.62	630	11.44	292
3	NEW NASHIK	3,01,607	135	21.46	1050	23.21	1166	21.18	259
4	NASHIK ROAD	2,42,922	99	15.74	788	17.42	950	17.25	256
5	PANCHAVATI	2,87,432	180	28.62	1010	22.33	1235	22.43	233
6	SATPUR	2,32,619	83	13.20	645	14.26	830	15.08	280
	TOTAL	14,86,053	629	100	4523	100	5506	100	270

Source: i) Health Department, Nashik Municipal Corporation.

ii) Town Planning Department, Nashik Municipal Corporation.
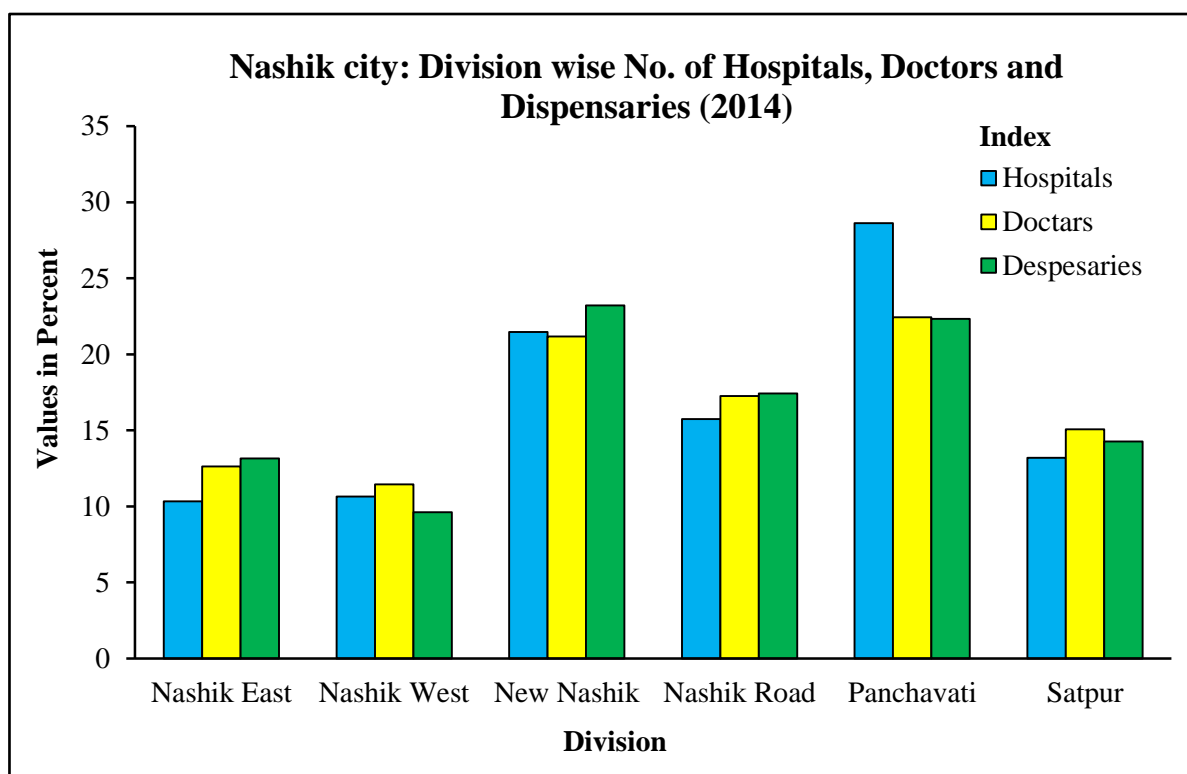
Fig. 4.39

There are 629 Total No. of Hospitals observed in study area out of which the highest nos. are observed in Panchavati Division i.e. 180 Nos. and the Lowest nos. are observed in Nashik East Division i.e. 65 Nos. These two Divisions have the highest and the lowest percentage to the total Hospital in study area i.e. 28.62 per cent and 10.30 per cent respectively.

There are 4523 Total No. Of Dispensaries observed in study area out of which highest nos. are observed in New Nashik Division i.e. 1050 Nos. and Lowest nos. are observed in Nashik West Division i.e. 435 Nos. These two Divisions have the highest and the lowest percentage to the total Dispensaries in study area i.e. 23.21 per centand 9.62 per cent respectively.

In the study area 5506 total nos. of Doctors are observed out of them, the highest nos. are observed in Panchavati Division i.e. 1235 Nos and the Lowest nos. are observed in Nashik West Division i.e. 630 Nos. These two Divisions have the highest and the Lowest percentage to the total Hospital in study area i.e. 22.43per cent and 11.44per cent respectively.

According to Division wise total population and availability of Nos. of Doctors in that Division i.e. Ratio of Doctors to its Division Population Nashik East Division has Lowest Ratio i.e. 1 Doctor after 342 people and the highest Ratio is

observed in Panchavati Division i.e.1 Doctor after 233 person. According to total Population of study area i.e. 14, 86,053 total no. of Doctors are 5506. The ratio observed 1 doctor after 270 people.

4.27 NASHIK CITY: EDUCATION AMENITIES

DIVISION WISE DISTRIBUTION OF EDUCATION FACULTIES AND THEIR PERCENTAGE TO TOTAL:

Only the education makes man perfect. When a man become perfect he can developed a perfect thing but I am not talking about that educated person who use their education for bad things. So in any developing or developed country education is the most important and considerable factor which is studied by geographer while studying urbanization of that city. Education also improves trade and commence of the city. It seems that education improves vision as well as awareness. If it is essential to know the society then education is only one way to do this. It gives development and disciplined life to man. It provides strength to man to improve its economy and standard of living.

As per discussed above, education is also the considerable factor to improve urbanization of study area. In the present 351 nos of primary schools, 254 secondary schools and 34 different colleges which show a perfect established education structure in the study area. In the last two decades, the establishment and improvement of education facility in the study area are at a very high rate. As rapid increase in population, education facility also increased rapidly as never seen in other developed cities in India. The Table No. IV-XXII and Fig. 4.40, Fig. 4.41, Fig. 4.42, Fig. 4.43 show the division wise distribution of numbers of Schools and Colleges, number of Students and their percentage to total.

TABLE NO. IV-XXII

NASHIK CITY: DIVISION WISE DISTRIBUTION OF EDUCATION FACULTIES AND

THEIR PERCENTAGE TO TOTAL (2014)

SR. NO.	FACULTY	NASHIK EAST	NASHIK WEST	NEW NASHIK	NASHIK ROAD	PANCH -AVATI	SAT PUR	TOTAL
1	PRIMARY SCHOOL	40	65	75	72	59	40	351
	NO.OF. STUDENT	33,722	55,003	63,529	60,735	49,315	33,611	2,95,916
2	HIGHER SECONDERY SCHOOL	38	54	43	40	45	34	254
	NO.OF. STUDENT	26,235	39,063	30,303	28,235	31,525	23,540	1,78,901
3	ENGINEERING COLLEGE	-----	5	2	2	5	2	16
	NO.OF. STUDENT	-----	5,200	1,500	1,600	5,350	1,400	15,050
4	MEDICAL COLLEGE	-----	2	2	1	11	2	18
	NO.OF. STUDENT	-----	300	500	240	7,180	800	9,020
	TOTAL FACULTY	**78**	**126**	**122**	**115**	**120**	**78**	**639**
	% OF TOTAL FACULTY	**12.20**	**19.72**	**19.10**	**18.00**	**18.78**	**12.20**	**100**
	TOTAL STUDENT	**59,957**	**99,566**	**95,832**	**90,810**	**93,370**	**59,351**	**4,98,887**
	% TOTAL STUDENT	**12.02**	**19.96**	**19.21**	**18.20**	**18.71**	**11.90**	**100**

Source: 1) Education Department, Nashik City (2014)

Fig. 4.40

Fig. 4.41

Nashik city: Division wise Distribution of Education Faculties (Engineering and Medical Colleges) (2014)

Fig. 4.42

Nashik city: Division wise Distribution of Education Faculties (Engineering and Medical College Students) (2014)

Fig. 4.43

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In the study area total 351 Primary Schools and 2, 95,916 Students are observed out of which highest Primary Schools observed in New Nashik Division i.e. 75 Numbers and Lowest Primary Schools observed in Nashik East and Satpur Division i.e. 40 Numbers.

In the study area, total 254 High Schools and 1,78,901 Students are observed out of which highest nos. of High Schools are observed in Nashik West Division i.e. 54 Numbers and Lowest nos. of High Schools are observed in Satpur Division i.e. 34 Numbers.

In the study area total 16 Engineering Colleges and 15,050 Students are observed out of which highest Engineering College are observed in Nashik West and Panchavati Division i.e. 5 Nos. with 5200 and 5350 Nos. of Students respectively.

In the study area, total 18 Medical Colleges and 9,020 Students are observed out of which highest nos. of Medical Colleges are observed in Panchavati Division i.e. 11 Numbers and Lowest nos. of Medical Colleges are observed in Nashik Road Division i.e. 1 Numbers.
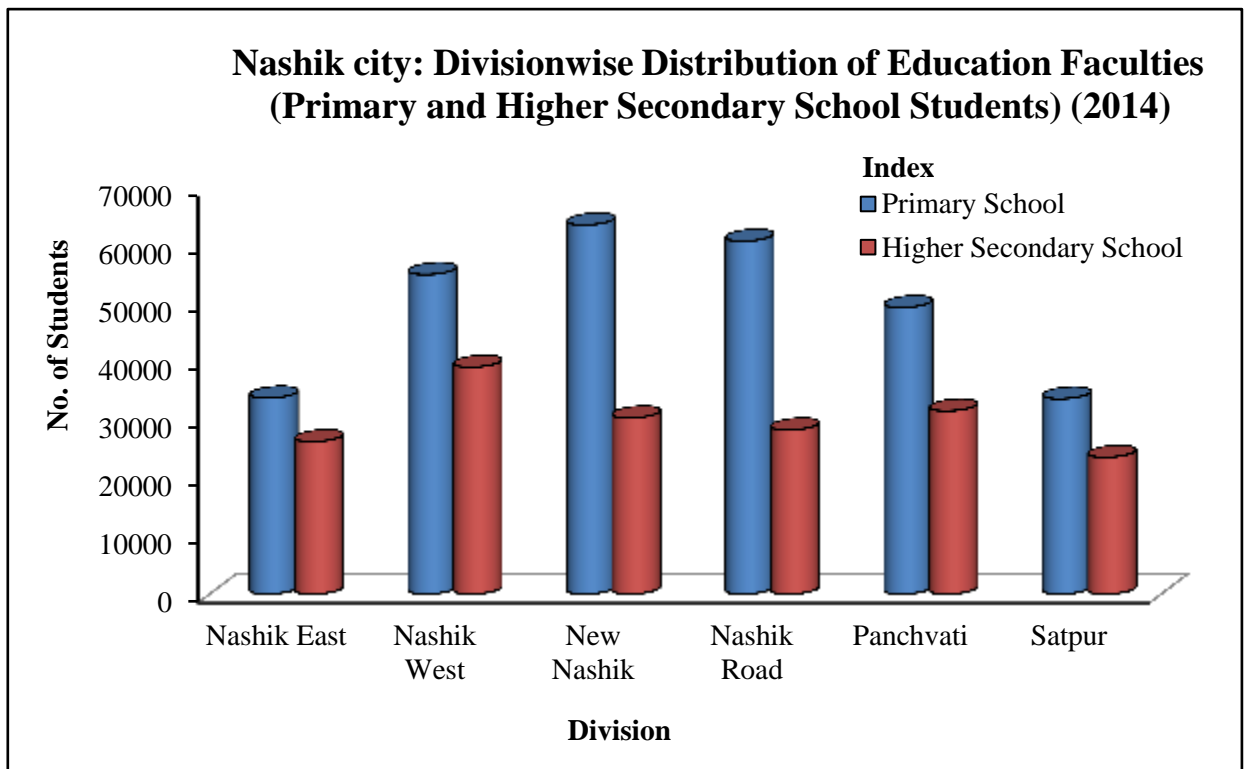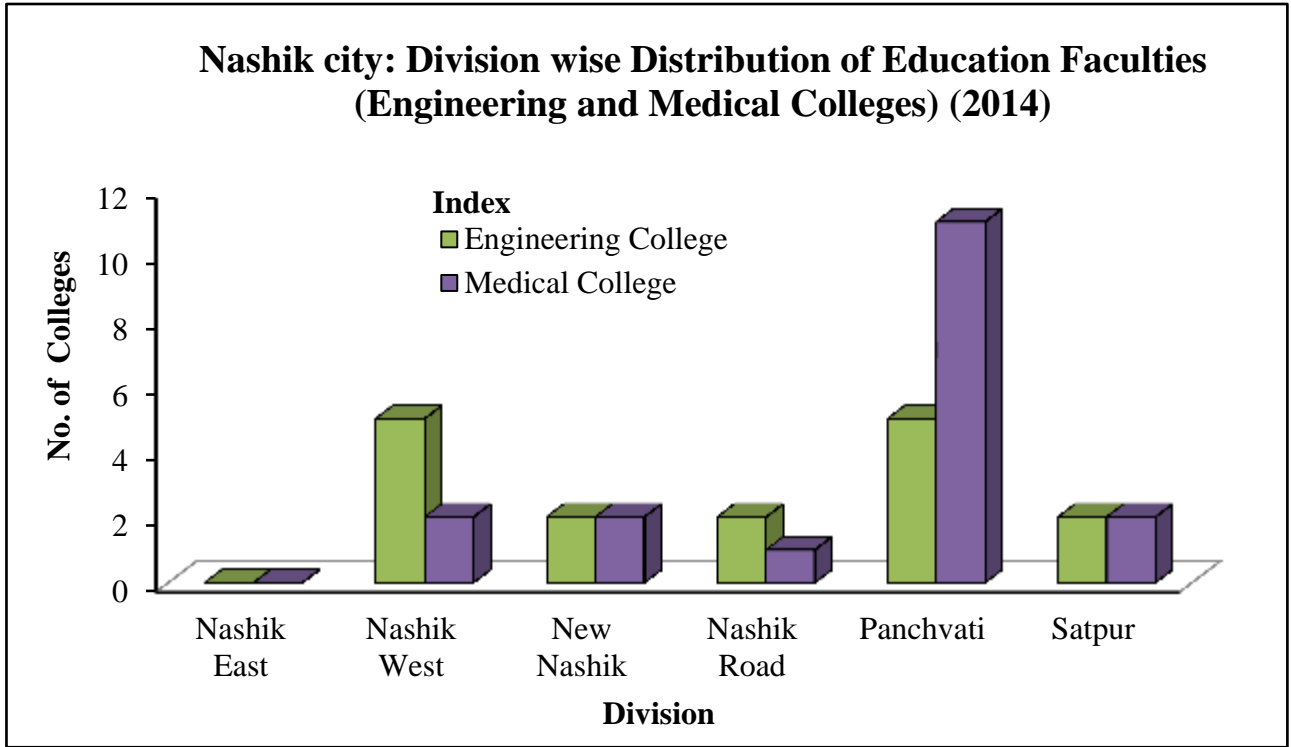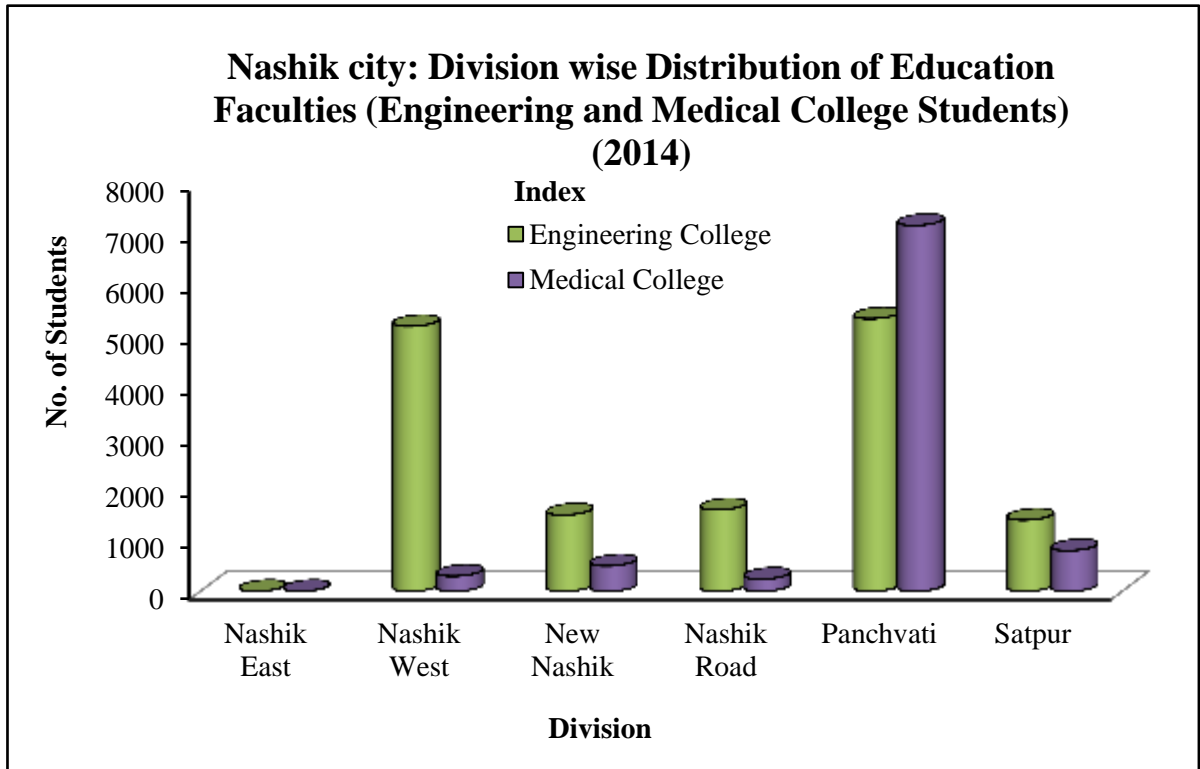
According to Division wise total Education Faculties to the total Education Faculties in study area Nashik West and New Nashik Division have the highest percentage of total Education Faculties i.e. 19.72% and 19.10% respectively. And lowest percentage is observed in Nashik East and Satpur Division i.e. 12.20%.

In the study area 4, 98,887 Total No. Of Students are observed out of which highest no. of students are observed in Nashik West Division i.e. 99,566 Numbers and Lowest no. of students are observed in Nashik East and Satpur Division i.e. 59,957 and 59,351 Nos. respectively, According to Division wise total student and Total No. of Students in the study area Nashik West Division has the highest percentage of student i.e. 19.96% and Satpur has the lowest percentage of student i.e. 11.90%

*   <u>POPULATION AND OCCUPATIONAL STRUCTURE OF NASHIK CITY.</u>

4.28   SALIENT FEATURES OF GROWTH AND DEVELOPMENT:

Population growth rate of Nashik is larger than urban India, Maharashtra and nearest metro city Mumbai in between 1981-2011. Growth rate of Nashik observed in decade 1981-2011 are 49.03 per cent, 50.33 per cent, 63.98 per cent, and 37.95 per

cent respectively is the highest among the cities of Maharashtra (Mumbai, Pune, and Nagpur)

TABLE NO.IV-XXIII

GROWTH TREND OF SIX DECADES IN URBAN AREAS.

(Population in lakhs)

Sr. No	Cen. Year	All India	Change %	Maha-rashtra	Change In %	Mumbai	Change %	Nashik	Change %
1.	1951	624.44	-------	92.01	-------	29.67	-------	1.49	-------
2.	1961	789.37	26.43	111.63	17.57	41.52	39.39	2.01	35.06
3.	1971	1,091.14	38.21	157.11	40.74	59.71	43.81	2.74	36.68
4.	1981	1,597.27	46.38	219.94	39.39	82.43	38.05	4.32	57.40
5.	1991	2,180.00	36.48	305.40	38.85	99.26	20.41	7.25	52.05
6.	2001	2,853.00	30.87	411.00	42.40	111.14	11.97	10.77	63.98
7.	2011	3,770.00	32.14	508.28	23.67	124.78	12.27	14.86	37.95

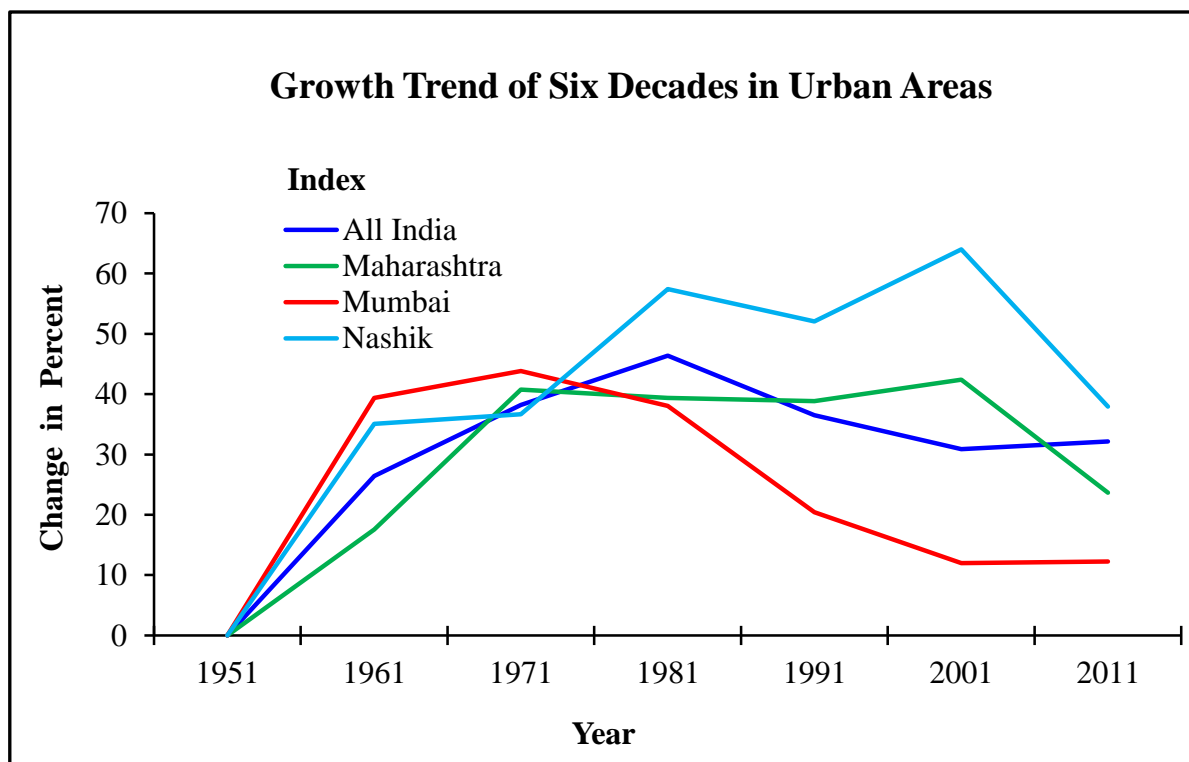Source: - CDP under JNNURM for Nashik Municipal Corporation

Fig. 4.44

Nashik has grown in population from 21,490 to 14,86,053 up to 2011. Mumbai has 157 years to grow from a base population of 70,000 in 1744 to a million in 1901. Nashik has achieved this starting from 1945 to year 2001. Nashik was seventh largest city of Maharashtra in 1947 and it is the 4th largest Industrial city. It has got 13 per cent working population in primary i.e. agriculture part which is more than other larger cities of Maharashtra; Nashik has the second highest working population in service Sector (27 per cent). (CDP of Nashik)

In the conclusion it has been observed that the population of Nashik city continuously increasing from 1901 to 2011, minimum growth rate was recorded in 1951 to 1961 decade because of severe drought in the study area, and maximum growth rate of population was recorded in 1961 to 2011. During these 50 years Nashik has become fourth largest city in Maharashtra.

A comparative study of decade wise growth rate of urban population in the study area and Nashik district is shown in Table No. IV-XXIII and Fig. 4.44.

TABLE NO.IV-XXIV

DECADE WISE GROWTH RATE OF POPULATION IN NASHIK CITY AND NASHIK DISTRICT (1901 TO 2011)

(IN PER CENTAGE)

Sr. No.	Decade	Nashik city population	Nashik District Urban population
1	1901-1911	(+)40.06	(+) 02.97
2	1911-1921	(+)27.02	(+) 06.57
3	1921-0931	(+)19.65	(+) 06.61
4	1931-1941	(+)14.52	(+) 21.47
5	1941-1951	(+)85.24	(+)110.26
6	1951-1961	(+)35.10	(+) 28.39
7	1961-1971	(+)34.32	(+) 42.84
8	1971-1981	(+)49.03	(+) 36.80
9	1981-1991	(+)50.33	(+) 47.51
10	1991-2001	(+)63.98	(+) 41.52
11	2001-2011	(+)37.95	(+)34.10

Source: - Census of India, District census Handbook Nashik District, 1901 TO 2011.
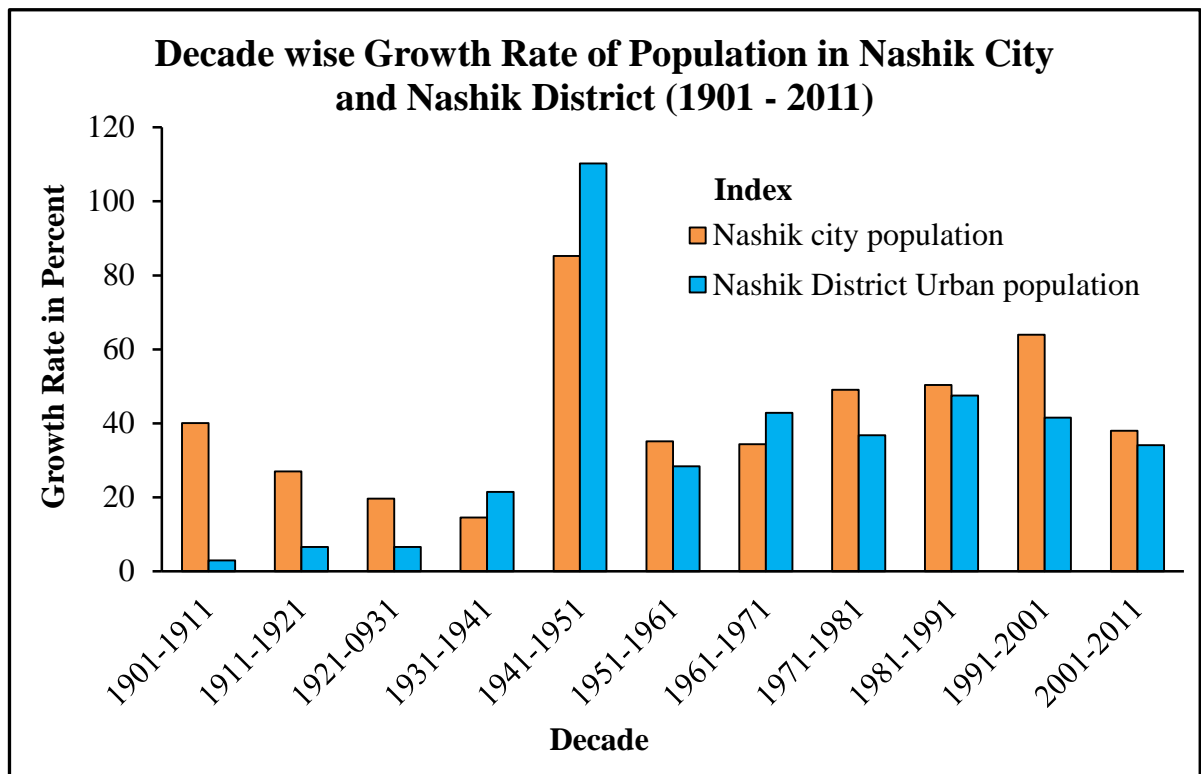
Fig. 4.45

The Table No. IV-XXIV and Fig. 4.45 show the population growth trend of Nashik city. This shows that Nashik district population growth trend decreased in decades 1901-11 and 1921- 31 as compared to last five decades. Nashik city shows gradual increase in population growth rate in decade 1901-11. It is observed 40% population growth rate where at the same time Nashik district was only of 2.97 per cent. In decade 1931-41 Population growth of Nashik city is observed with low rate i.e. 14.52 per cent.

According to Table No. IV-XXIV it has been observed that in last 10 decades population growth rate in Nashik city and Nashik district is gradually increasing.

4.29   POPULATION GROWTH IN NASHIK CITY:

In 2011, Nashik has become a million plus city. The growth trends of Nashik city during the 19th century considered because earlier data before 1901 census are not possible to analyze. However population growth is considered for the period 1901 to 2011. It has increased from 21,490 persons in 1901 to 14, 86,053 in 2011, i.e. more than fifty fold increase.

During the first decade of 20th century the decennial growth rate was 37.95 per cent or an annual growth rate of 3.3 per cent was experienced.

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TABLE NO.IV-XXV

POPULATION GROWTH IN NASHIK CITY

(1901 TO 2011)

Sr. No.	Year	Total population *	Absolute Growth **	Growth in Percentage **	Annual Growth Rate by Gibb's Method **
1	1901	21,490			
2	1911	30,098	8,608	+40.06	3.33
3	1921	38,230	8,132	+27.02	2.38
4	1931	45,744	7,514	+19.65	1.79
5	1941	52,386	16,642	+14.52	1.35
6	1951	97,042	44,656	+85.24	5.97
7	1961	1,31,103	34,061	+35.10	2.99
8	1971	1,76,091	44,988	+34.32	2.93
9	1981	2,62,428	86,337	+49.03	3.94
10	1991	6,56,925	3,94,497	+50.33	8.58
11	2001	10,77,236	4,20,311	+63.98	4.85
12	2011	14,86,053	4,08,817	+37.95	3.16
13	2011#	17,66,469	6,89,233	+63.98	10.99

Source: - * Census of India, District census Handbook Nashik District, 1901 TO 2011.

projected population by Geometric rate of increased method.

According to 2001 census population has crossed 10 lakh mark and found to be 10, 77,236 persons, the net increase in the population during this decade account to 14, 86,053 persons by 63.98 per cent decadal growth rate.

In the year 2011 population was recorded 14,86,053 and the 37.95 per cent decadal growth rate, the absolute increase in this decadal observed to 17,66,469 persons. (As shown in Table No. IV-XXV and Fig. 4.46, Fig. 4.47, Fig. 4.48, Fig. 4.49)
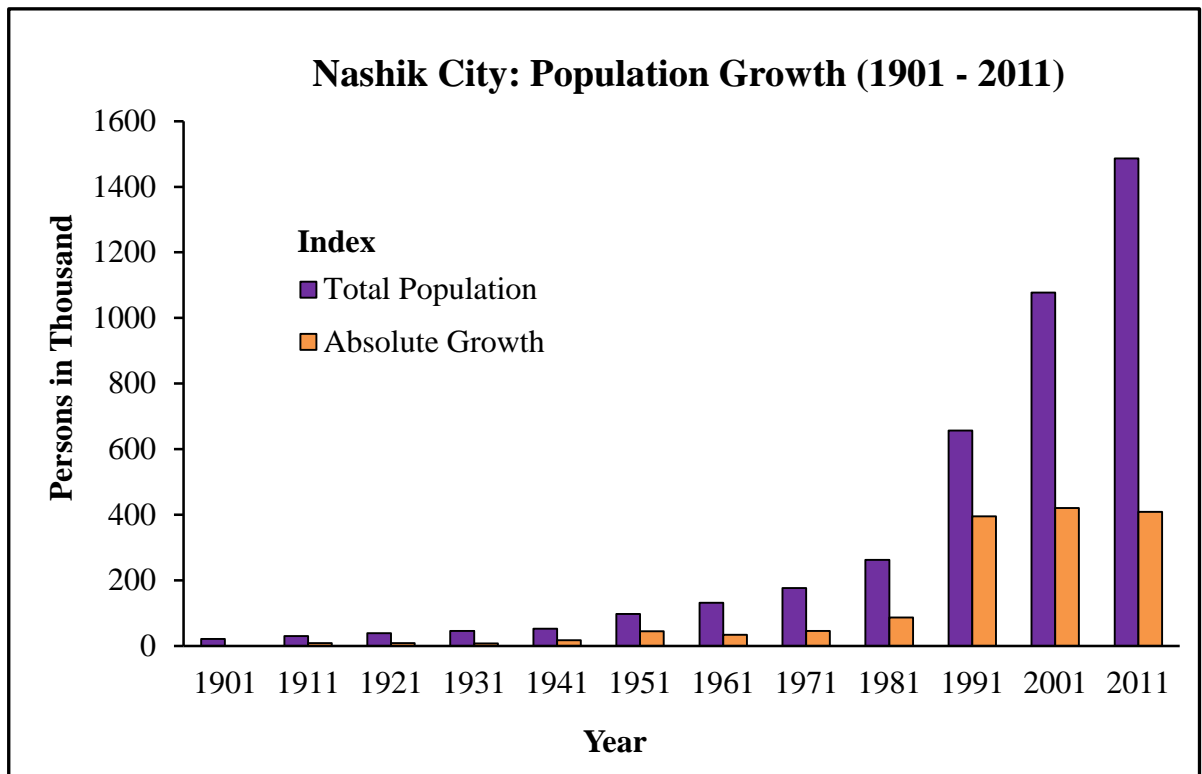
Fig. 4.46
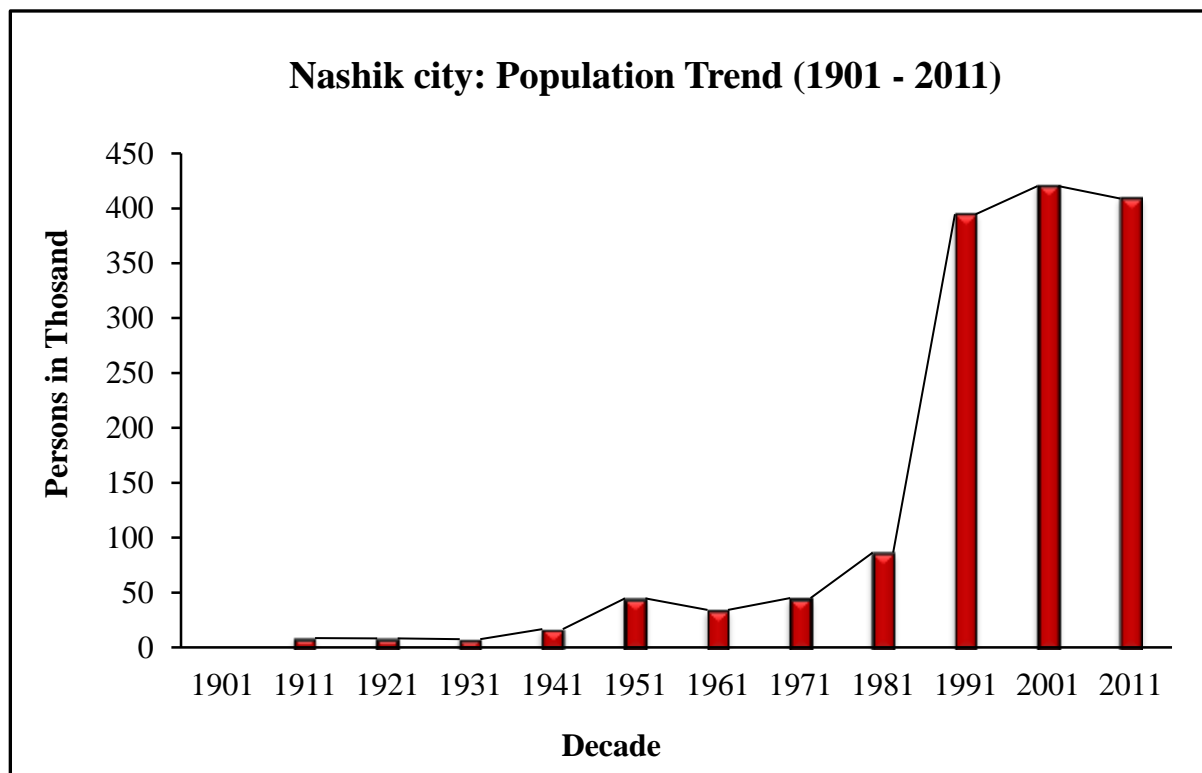
Fig. 4.47
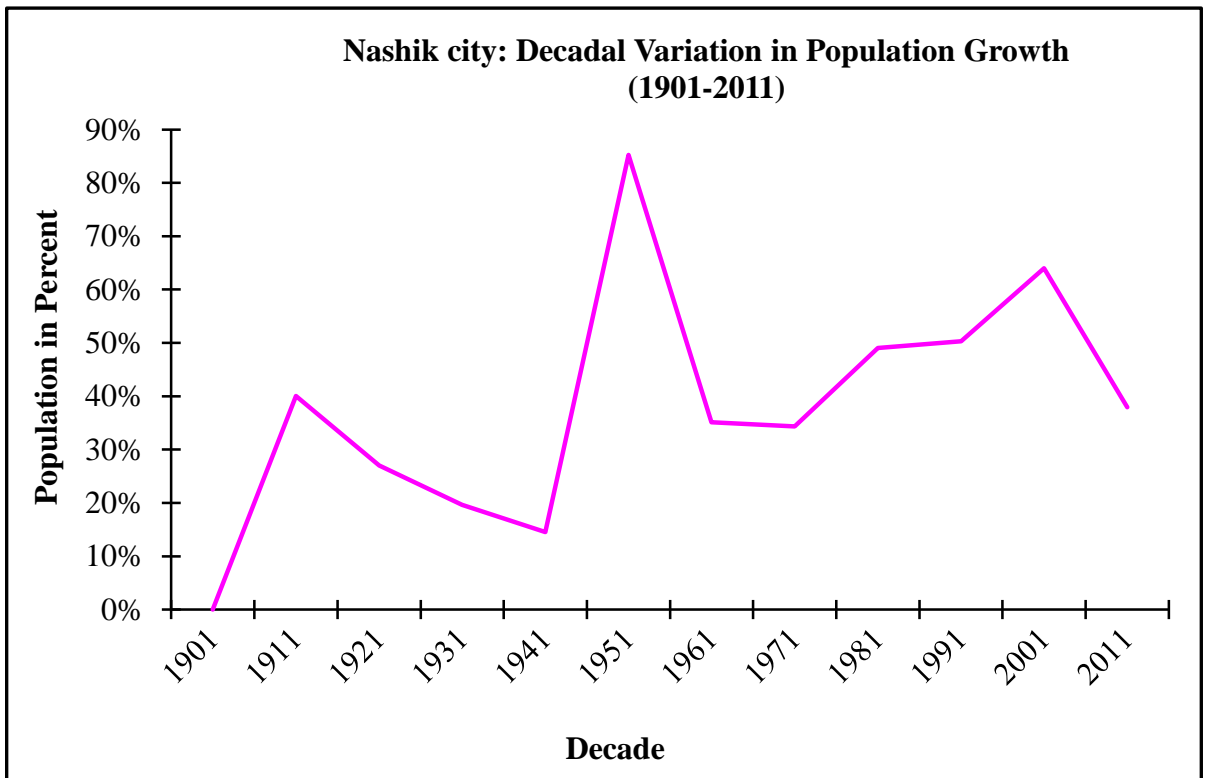
Fig. 4.48
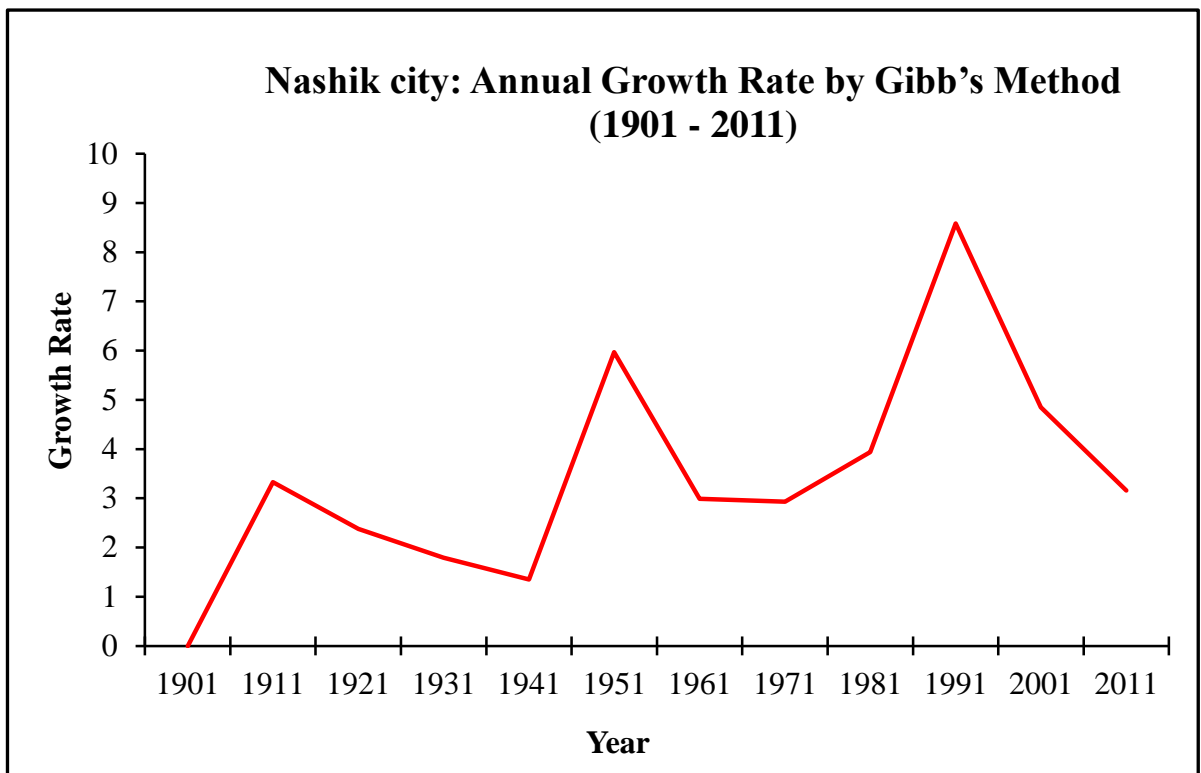
Fig. 4.49

4.30 POPULATION PROJECTION INCREMENT.

Nashik city has been expanding and the growth pattern of existing since last four decades has been used in the total anticipated population as given bellow.

TABLE NO.IV-XXVI

NASHIK CITY: POPULATION PROJECTION INCREMENT.

Sr.No.	Year	Population	Increment
1	1971	1,76,091	-----
2	1981	2,62,428	86,337
3	1991	6,56,925	3,94,497
4	2001	10,77,236	4,20,311
5	2011	14,86,053	4,08,817
Total Average			3,27,490.5

Source: - *   Census of India, District census Handbook Nashik District,

1971 TO 2011.
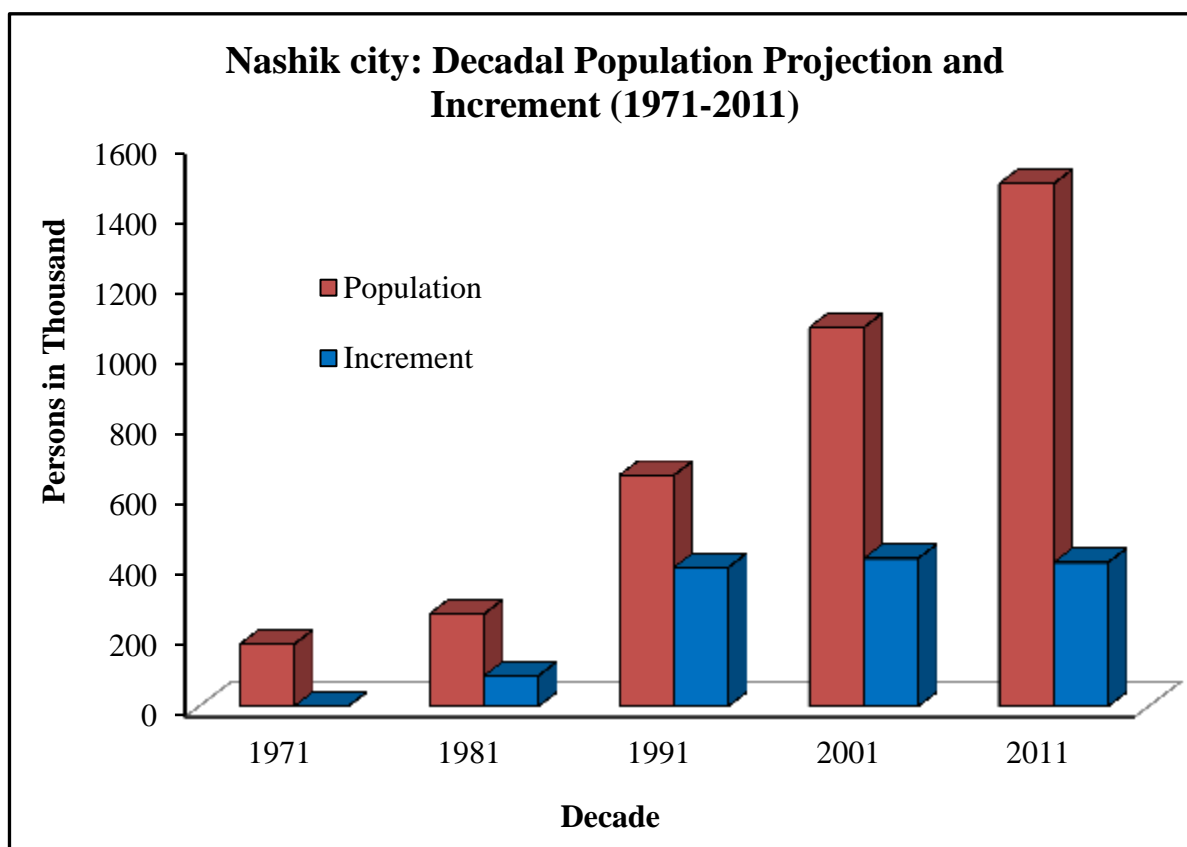
Fig. 4.50

By Arithmetical increase method, increase in the population in these decades is predominant and it can be seen that average increase in the population shows the trend of fast development. It may be due to number of following reasons, Nearness to Mumbai and Pune, very good climate in all seasons, Holy place and Pilgrimage center, Good infrastructure, Good connectivity through road and rail, Atmosphere of industrialization, Good education center, Good cultural activities, commissioner and District headquarters, Agricultural produce market. (CDP of Nashik) As shown in Table No. IV-XXVI and Fig. 4.50.

4.31   DENSITY OF POPULATION:

Density of population is the most important variable which plays an important role in constructing, Re-constructing and planning of the cities. This analysis gives view to the geographer to understand the urban character of that city, its resources and development. It also helps to understand mankind, Nature of people. Density of population is directly proportional to the urban resources of the city.

The Table No. IV-XXVII and Fig. 4.51, Fig. 4.52 gives clear idea about the density of population in Nashik city.

<div align="center">

TABLE NO.IV-XXVII

NASHIK CITY: DENSITY OF POPULATION

(1951 TO 2011)

</div>

Sr. No.	Year	Total Population. *	Area in sq. km *	Density of population. per sq. km **
1	1951	97,042	58.28	1,665
2	1961	1,31,103	58.28	2,249
3	1971	1,76,091	58.28	3,021
4	1981	2,62,428	58.28	4,503
5	1991	6,56,925	259.10	2,535
6	2001	10,77,236	259.10	4,158
7	2011	14,86,053	259.10	5,736

Source: *Census of India, District census Handbook Nashik District,1951 TO 2011.

Fig. 4.51

Fig. 4.52
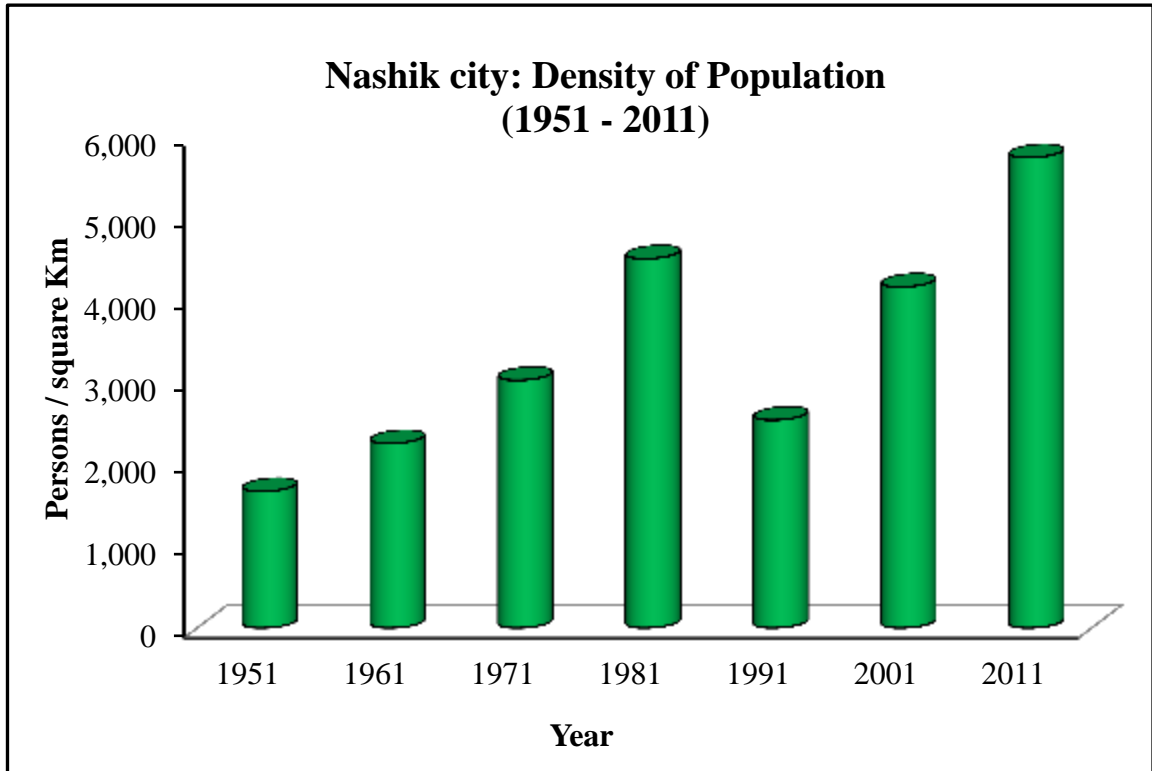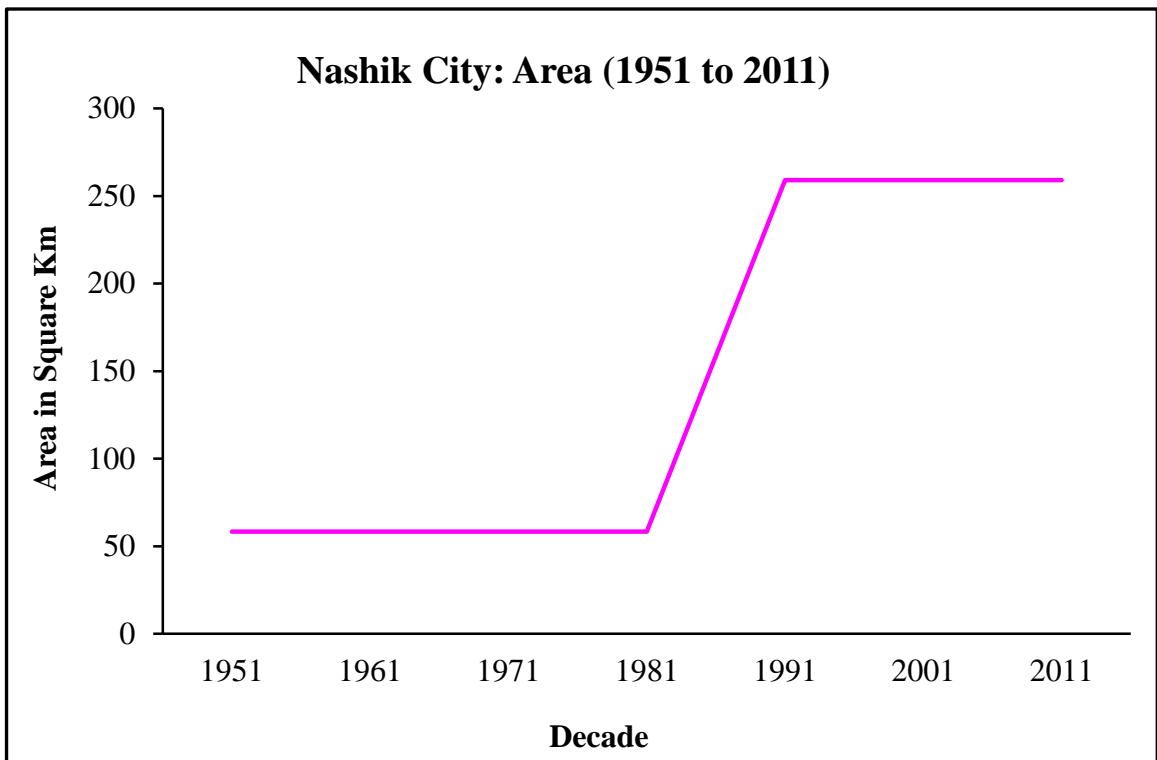
It is observed from the Table No. IV-XXVII and Fig. 4.51 and Fig. 4.52 that the density of population has been increased from 1951 to 2001. In 1951 the density was 1,665 persons/sq.km, which has been increased up to 4,503 in 1981. But in 1991

population density has been decreased i.e. 2535 people per sq.km, because of increase in area of Nashik city from 58.28 sq.km to 259.10 sq. km. It has been found that density of population increased again in 2011 up to 5,736 persons per sq.km, because of migration of people from rural areas.

4.32   DIVISION-WISE POPULATION GROWTH RATE IN NASHIK CITY:

The Table No. IV-XXVIII and Fig. no. 4.53, 4.54 show that, the trend of population growth of Nashik city indicates gradual increase in population at the same time growth rate of urban population in Nashik district shows decreasing trend in 1901-11 and 1921-31 decades. In decade 1901-11, Nashik city has observed population growth rate 40.06 per cent but the urban population of Nashik district was decreased by 2.97 per cent. It is also observed that in decade 1931-41 population growth in Nashik city was 14.52 per cent which was very low. While the decreasing trend of urban population of Nashik district shows 28.39 per cent population growth. In decade 1941-51 highest growth rates have been observed in Nashik city (85.24 per cent) and Nashik District (110.26 per cent) it is because of migration from rural areas to urban areas.

In all decades it is observed that there is a gradual increasing of population growth rate in Nashik city and Nashik district in urban population.

TABLE NO.IV-XXVIII

NASHIK CITY: DIVISION-WISE GROWTH RATE OF POPULATION

Sr. No.	DIVISION NAME	1991 – 2001		2001-2011	
		Total population	Growth in Percentage	Total population	Growth in Percentage
1	NASHIK EAST	1,65,423	-02.28	2,37,660	69.60
2	NASHIK WEST	1,23,481	114.01	1,83,813	67.18
3	PANCHAVATI	2,14,950	93.41	2,87,432	74.78
4	NASHIK ROAD	1,90,326	49.94	2,42,922	78.35
5	NEW NASHIK	2,14,256	91.07	3,01,607	71.04
6	SATPUR	1,68,800	111.67	2,32,619	72.57
	Total	**10,77,236**	**63.98**	**14,86,053**	**72.49**

Source: -Census of India, District census Handbook Nashik District,1991, 2001 and 2011.

Nashik city: Division wise Growth Rate of Population (1991-2011)

Index
- 1991-2001
- 2001-2011
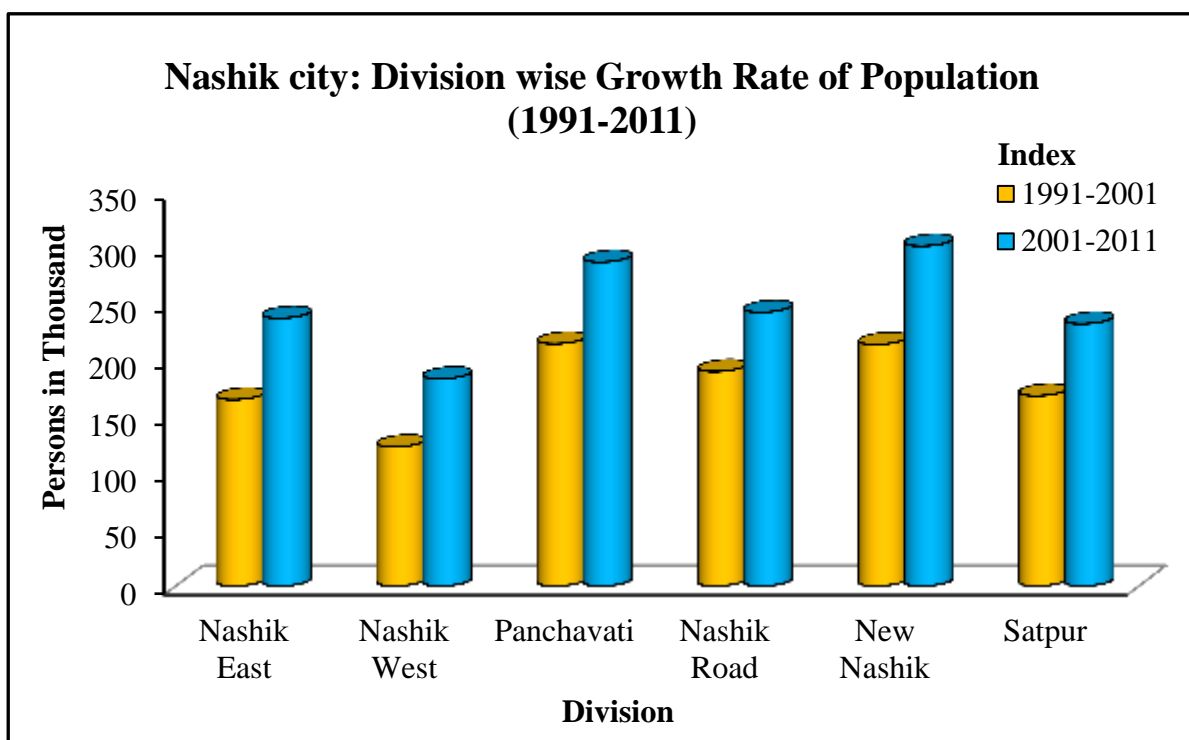
Fig. 4.53

A comparative analysis of division wise growth of population indicates that there are significant differences in the population growth for various divisions of Nashik city. It is observed that during the decade of 2001-2011, population growth rate was increasing in all division the rate was highest in Nashik Road division (i.e. 78.35 per cent) and lowest in Nashik West division. In Satpur division the growth of population is more than the average of the city i.e. 72.49 per cent, the remaining Nashik East, Panchavati and New Nashik divisions have less growth rate of population than average of the city.

During 1991-2001 decade the higher growth rate of population has been observed in the Nashik West division (114.01 per cent) because of new colonies have been developed in this division and lowest in the Nashik East division (02.28 per cent) due to the unviability of area for new development. Nashik West division having higher population growth rate except Nashik Road division than the city average (63.98 per cent)

As compared to population growth rate of 1991-2001 decade to 2001-2011 it has been observed that population growth rate of Nashik East division has increased sharply (i.e. from 02.28 per cent, 69.60 per cent) and all divisions have shown increasing trend of population growth which leads to increasing the population in future. The IV-XXVIII and Fig. 4.53, Fig. 4.54 give clear idea about the growth of population.

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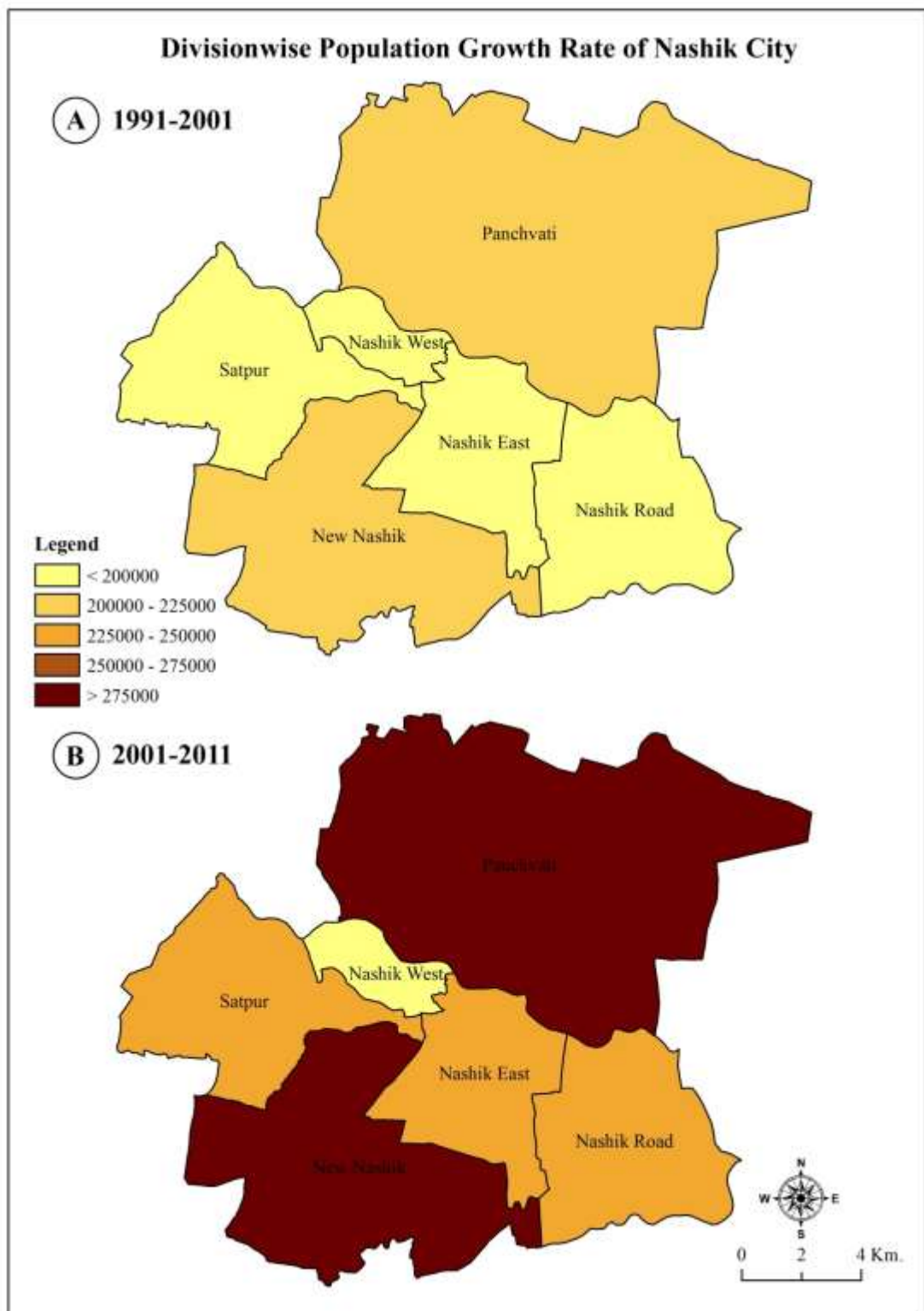
Fig. 4.54

4.33 DIVISION-WISE DENSITY OF POPULATION

Density of population in Nashik city is found very high in core part of the city, with small multistoried antiquated buildings and narrow lanes. It is gradually decreases towards the peripherial part of the city, to the latter extension and recently developed areas in Nashik city. In the conclusion it is found that the population density of Nashik city has declined in a negative exponential manner with increasing distribution from the center of the city to outer part of the city.

TABLE NO.IV-XXIX

NASHIK CITY: DIVISION-WISE DENSITY OF POPULATION

(2001 – 2011)

DIVISION NAME	Area in sq. km *	Total population *		Density of population per sq. km **	
		2001	2011	2001	2011
NASHIK EAST	14.6	1,65,423	2,37,660	11,330	16278
NASHIK WEST	9.3	1,23,481	1,83,813	13,278	19765
PANCHAVATI	108.7	2,14,950	2,87,432	1,977	2644
NASHIK ROAD	32.7	1,90,326	2,42,922	5,820	7429
NEW NASHIK	56.8	2,14,256	3,01,607	3,772	5310
SATPUR	37.0	1,68,800	2,32,619	4,562	6287
Total	259.1	**10,77,236**	**14,86,053**	**4,158**	**5735**

Source: - * Census of India, District census Handbook Nashik District, 2001 and

2011.

Divisionwise Density of Population in Nashik City

(A) 1991-2001

Panchvati

Nashik West

Satpur

Nashik East

New Nashik

Nashik Road

Legend

Density / Sq. Km.

- < 3000
- 3000 - 6000
- 6000 - 9000
- 9000 - 12000
- > 12000

(B) 2001-2011

Panchvati

Nashik West

Satpur

Nashik East

New Nashik

Nashik Road

0   2   4 Km.

Fig. 4.55

It is observed from table no. IV-XXVIX and Fig. 4.55 that the density of population is the highest in Nashik East and Nashik West division which is nearly double as compared to sum of density of Panchavati, Nashik Road, New Nashik and Satpur divisions in 2001 decade. It has been observed double because Nashik West division and Nashik East are the core area part of old Nashik city. In the decade 2001 the density of 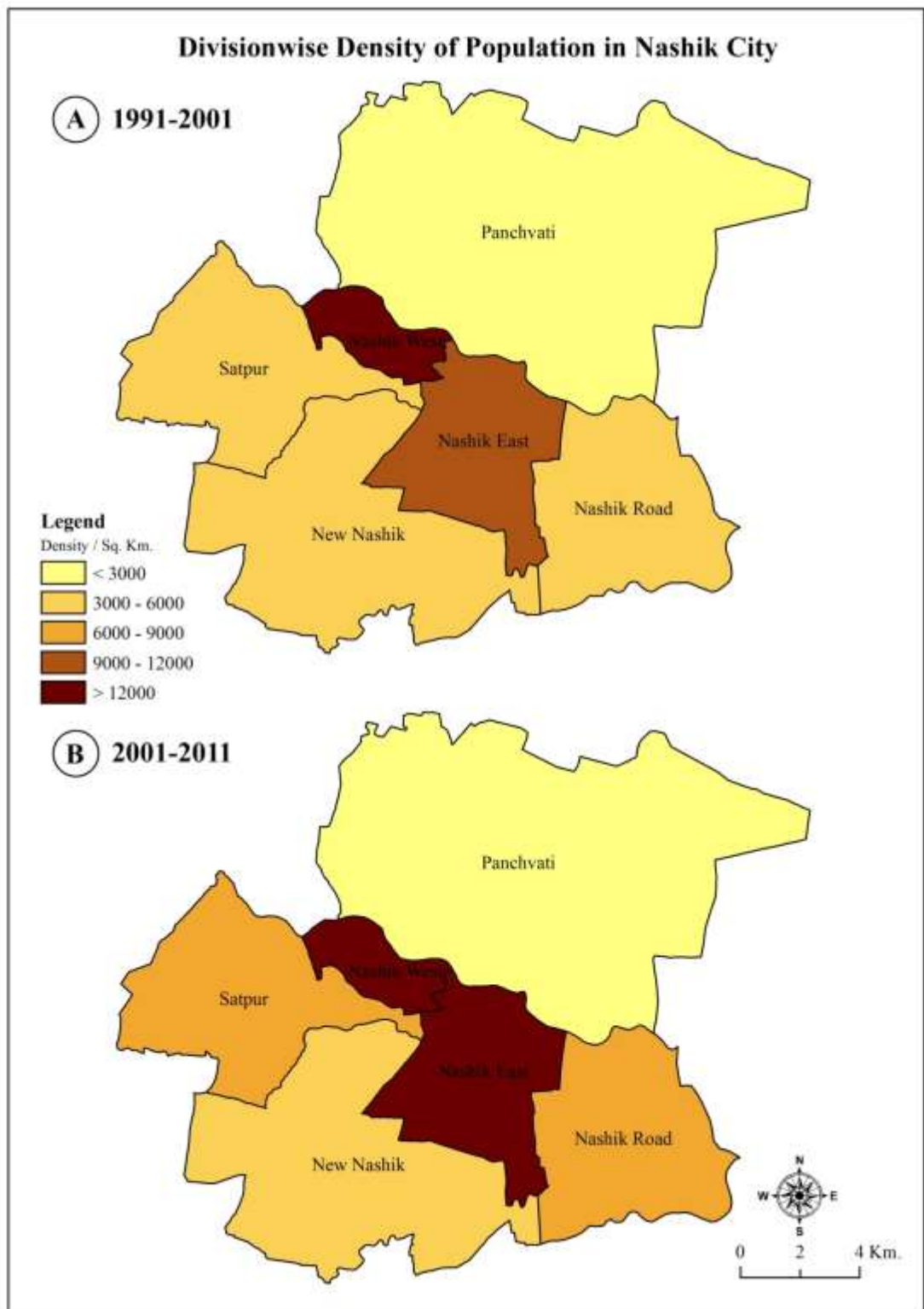population of Panchavati, Nashik Road, New Nashik and Satpur divisions has been got increased in the decade of 2011 because of migration from rural areas for employment purposed.

4.34   POPULATION DISTRIBUTION:

The population distribution of Nashik city is not uniform throughout the city. In general, the concentration of population is more dense in the core region and sparse towards the peripheral areas. In overall country this common phenomenon has observed for urban communities.

According to 2001 census, it is observed that, more than 55 per cent of the total population of Nashik city belongs to Panchavati, New Nashik and Nashik road divisions. The Panchavati, New Nashik and Nashik road division rank first, second and third with 19.95 per cent, 19.89 per cent, and 17.67 per cent of the total population respectively. The Nashik East, Nashik West and Satpur divisions have 15.36 per cent, 11.46 per cent and 15.67 per cent of the total population respectively.

The study region has 53.44 per cent males and 46.56 per cent females in 2001.The division wise percentile figure vary from 51.75 per cent to 55.00 per cent in case of male and 45.00 per cent to 48.25 per cent in case of females. The highest per cent of males has observed in Satpur division (55.00 per cent) and lowest in Nashik West division (51.75 per cent). The per cent figure for females is highest in Satpur division (48.25 per cent). The Nashik Road and New Nashik divisions have higher per cent of male population than the average male population of the study area (i.e.53.44 per cent). The Nashik East and Nashik West divisions have higher per cent of female population than the average of the female population in the study region (i.e. 46.56 per cent). The highest per cent of male has been observed in Satpur division because migration of male worker in M.I.D.C. area, While highest per cent of female has been observed in Nashik west division because of higher literacy rate. (Table No. IV-XXX and Fig. 4.56)

TABLE NO.IV-XXX

NASHIK CITY: DIVISIONWISE DISTRIBUTION OF POPULATION

(YEAR – 2001)

Sr. No.	DIVISION NAME	Male Population	Percent of Male	Female Population	Percent of Female	Total Population	Percent of Total Population
1	NASHIK EAST	85,742	51.83	79,681	48.17	1,65,423	15.36
2	NASHIK WEST	63,899	51.75	59,582	48.25	1,23,481	11.46
3	PANCHAVATI	1,16,493	54.19	98,457	45.81	2,14,950	19.95
4	NASHIK ROAD	1,01,852	53.51	88,474	46.49	1,90,326	17.67
5	NEW NASHIK	1,14,906	53.63	99,350	46.37	2,14,256	19.89
6	SATPUR	92,845	55.00	75,955	45.00	1,68,800	15.67
	Total	**5,75,737**	**53.44**	**5,01,499**	**46.56**	**10,77,236**	**100.00**

Source: - * Census of India, District census Handbook Nashik District, 2001

Fig. 4.56

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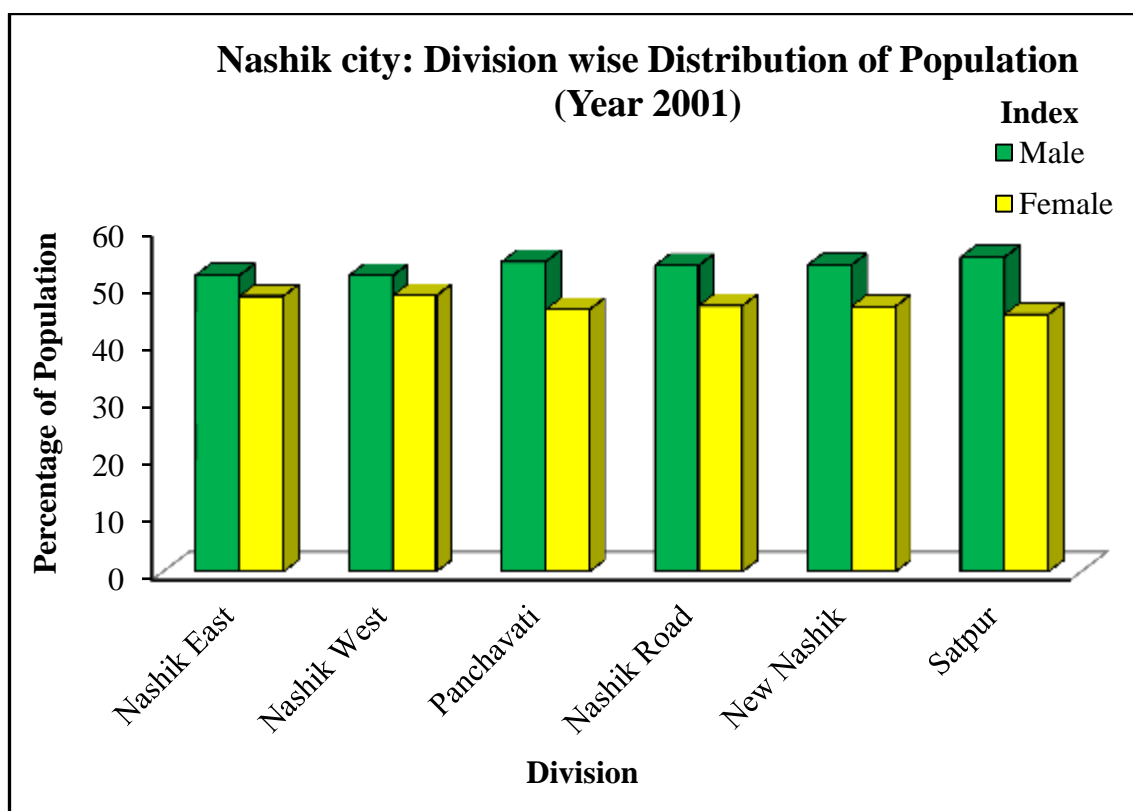
TABLE NO.IV-XXXI

NASHIK CITY: DIVISIONWISE DISTRIBUTION OF POPULATION

(YEAR – 2011)

Sr. No.	DIVISION NAME	Male Population	% of Male	Female Population	% of Female	Total Population	% of Total Population
1	NASHIK EAST	125251	52.70	112409	47.30	2,37,660	15.99
2	NASHIK WEST	94785	51.57	89028	48.43	1,83,813	12.37
3	PANCHAVATI	150166	52.24	137266	47.76	2,87,432	19.34
4	NASHIK ROAD	126167	51.94	116755	48.06	2,42,922	16.35
5	NEW NASHIK	160720	53.29	140887	46.71	3,01,607	20.30
6	SATPUR	125428	53.91	107191	46.08	2,32,619	15.65
	TOTAL	**7,82,517**	**52.66**	**7,03,536**	**47.34**	**14,86,053**	**100.00**

Source: - * Census of India, District census Handbook Nashik District, 2011.

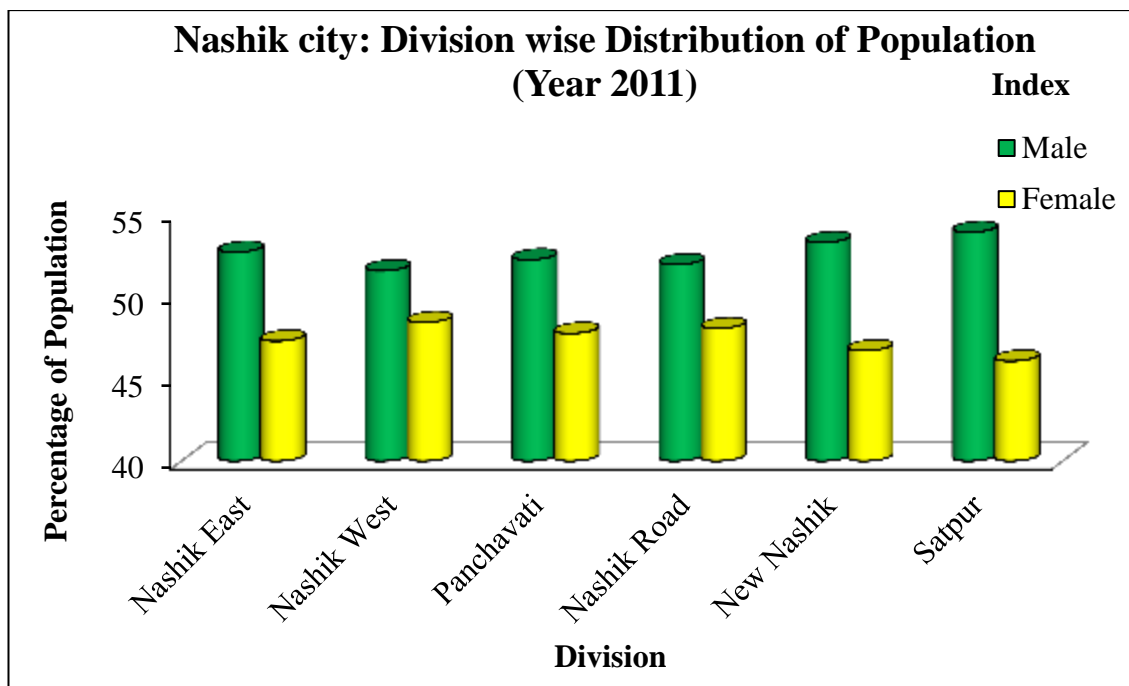**Nashik city: Division wise Distribution of Population (Year 2011)**

Fig. 4.57

According to 2011 census; it has been observed that the more concentration of population found in the Nashik Road division which is 20.30 per cent. The sparse population has been observed in the Nashik West and Satpur division (i.e. 12.37 per cent and 15.65 per cent). Panchavati division has 19.34 per cent of the total population and Nashik Road division has 16.35 per cent. Higher concentration of population is observed in the New Nashik division because it is an industrial area and have all urban amenities while Panchavati and Satpur divisions has sparse population because of less availability of urban amenities. The division wise distribution of population is also uneven. According to 2011 census the study region has 52.66 per cent males and 47.34 per cent females. A comparative analysis of division wise distribution of population indicates that the per cent of male population is highest in Satpur division (i.e. 53.91 per cent) and lowest in Nashik West division (i.e. 51.57 per cent), New Nashik and Satpur division have higher per cent of male's population than the average male population of the study region(i.e.52.66). This has been observed due to the migration of male population from the rural area to the urban area for employment purposes. The Per cent of females population is highest in the Nashik West division (i.e. 48.43) and lowest in the Satpur division (i.e. 46.08). Nashik East, Panchavati, Nashik Road and Satpur Divisions have higher per cent of female's population than the average of the female's population in the study area

(i.e. 47.34 per cent). Table No. IV-XXXI and Fig. 4.57, Fig. 4.58 and Fig. 4.59 gives us clear idea about division wise population distribution of Nashik city.

Fig. 4.58

Divisionwise Distribution of Female Population in Nashik City
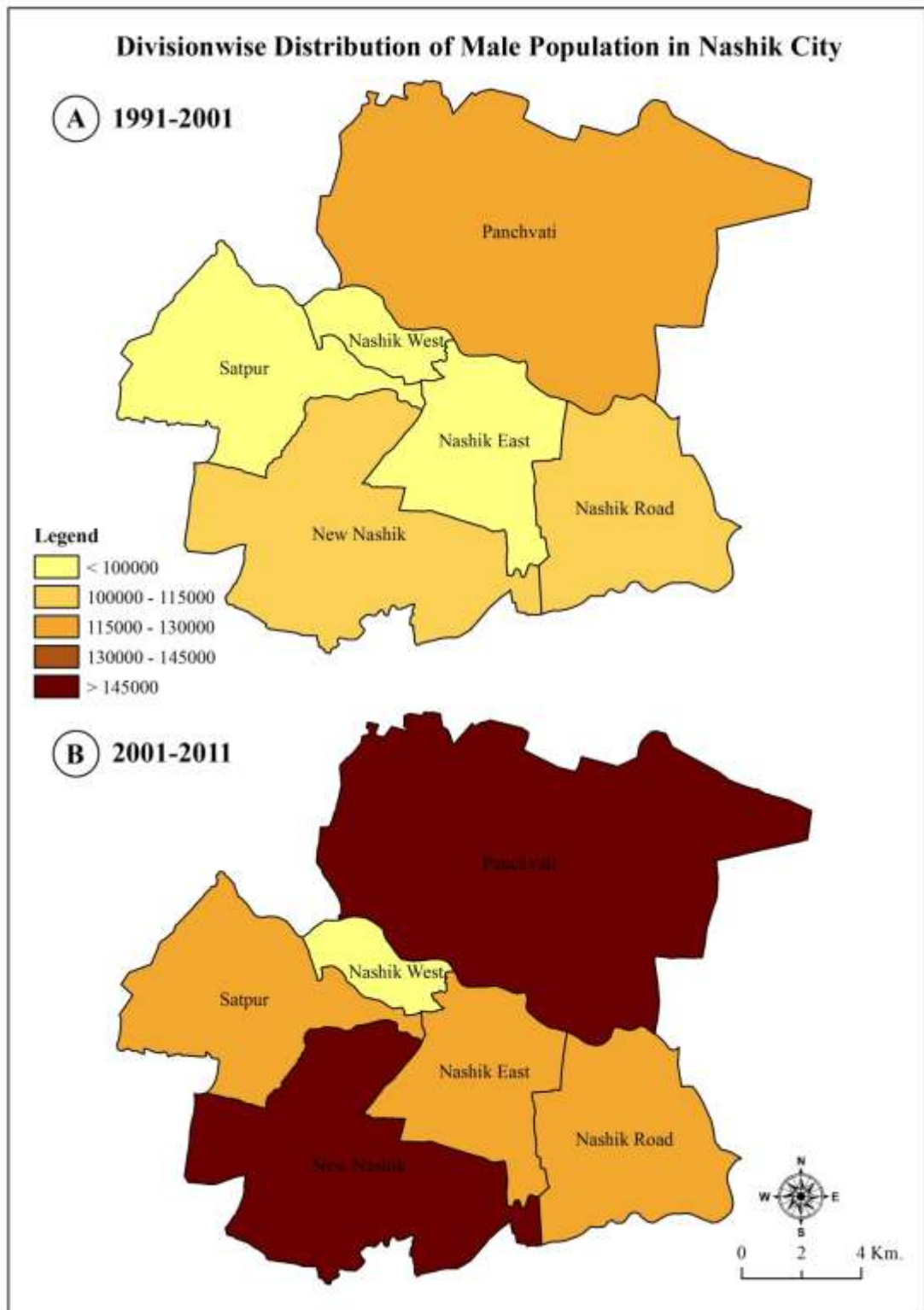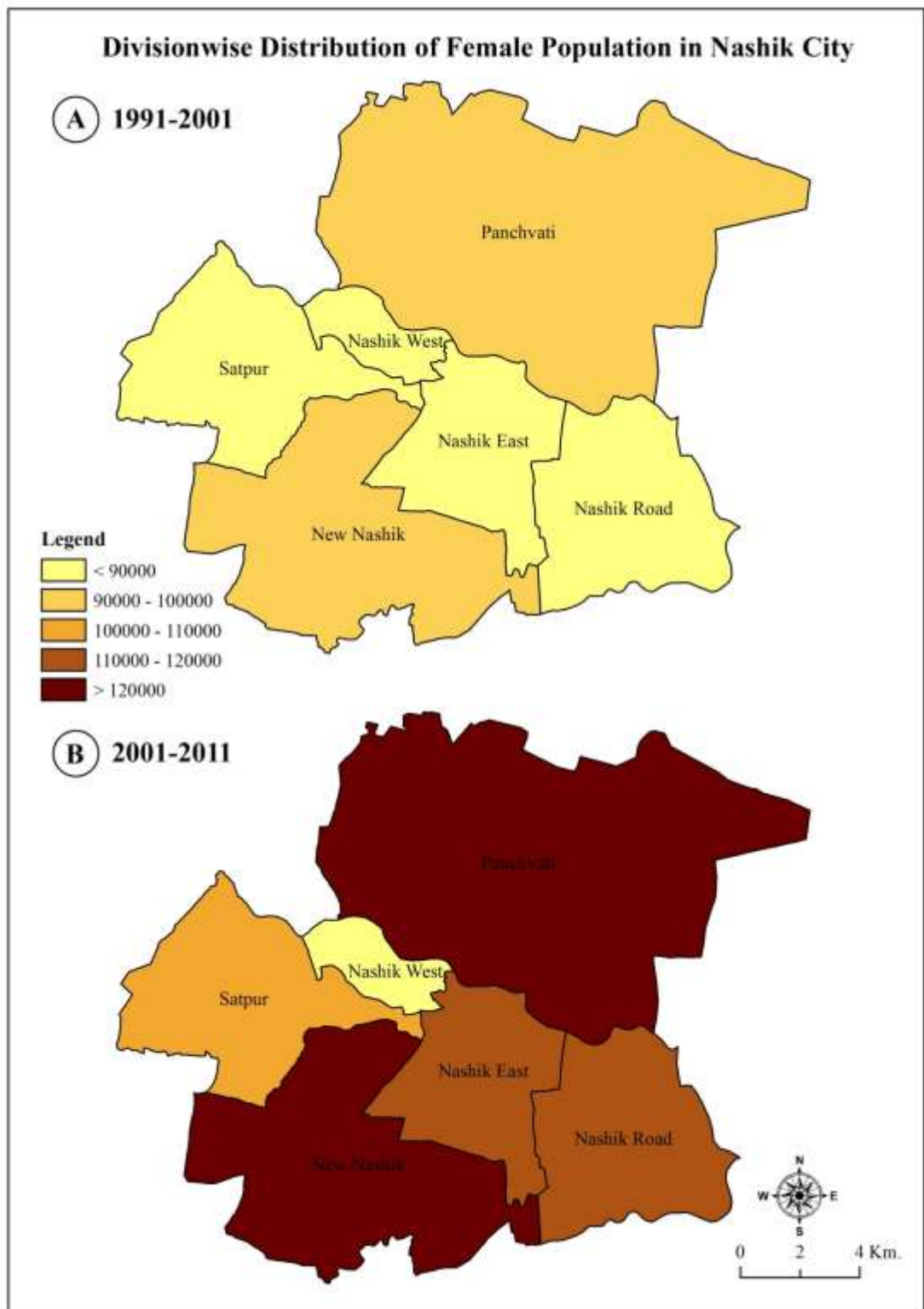
Fig. 4.59

4.35   LITERACY STRUCTURE:

We have studied earlier the important role of education in urbanization. The literacy structure telling us urban character of the city. It is helpful to tell us about education, degree of urbanization, economic strength, standard of living, status of woman. It is also helpful to tell us safety of woman within the city. Therefore the analysis of literacy pattern and trends in study region is of immense significance for the urban geographer. The table no. IV-XXXII and fig. No. 4.60 tell us the literacy structure of study region.

TABLE NO.IV-XXXII

NASHIK CITY: LITERACY STRUCTURE (1971 TO 2011)

Year	Total Literacy Population	% of Total Population	Total Male Literacy	% of Total Male Literacy	Total Female Literacy	% of Total Female Literacy
1971	1,09,286	62.06	66,586	71.76	42,700	51.26
1981	1,76,092	67.10	1,02,771	74.86	73,321	58.59
1991	4,46,348	67.94	2,58,325	74.35	1,88,023	60.75
2001	8,02,695	74.51	4,58,005	79.55	3,44,690	68.73
2011	11,45,747	77.10	6,31,796	80.72	5,13,951	73.05

Source: - * Census of India, District census Handbook Nashik District,

1971, 1981, 1991, 2001 and 2011

Fig. 4.60

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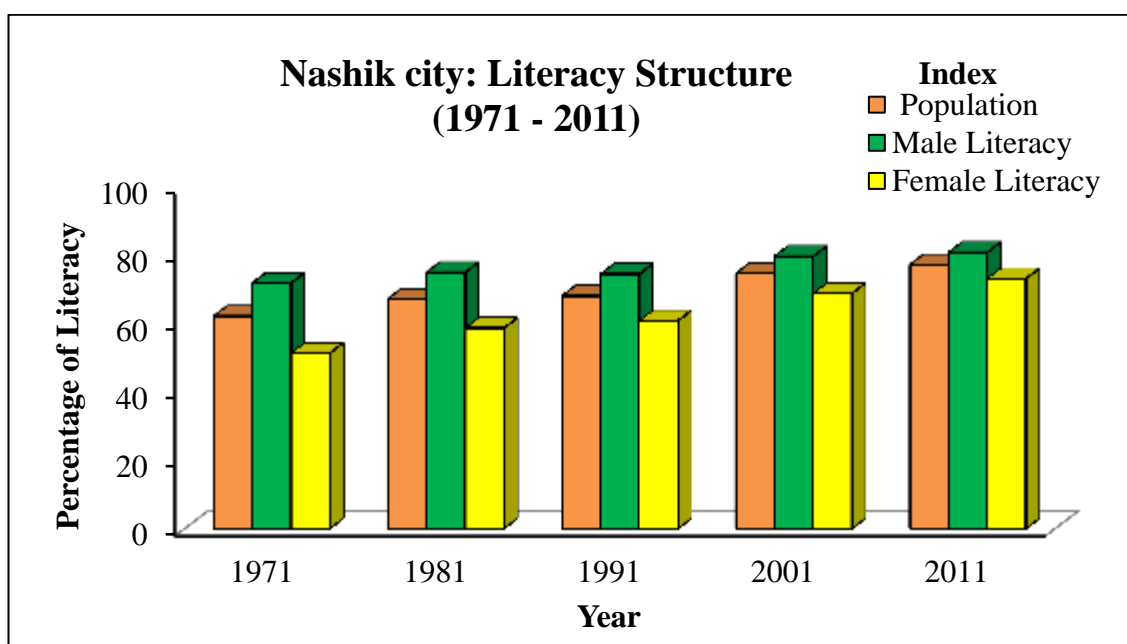
A high level of literacy reflects the dynamic character of city population. The total literacy population of Nashik city was 67.10 per cent in 1981 which increased up to 77.10 per cent in 2011. It is observed that the female literacy rate is much higher than that of male literacy rate. In 1981 only 58.59 per cent of the females in the city were literate; whereas 74.86 per cent of the males were literate. It is found to be increased in literacy rate up to 73.05 per cent of the females and 80.72 per cent of the males in 2011 (Table No. IV-XXXII and Fig. 4.60). The general increase in literacy ratio especially female literacy because of the increased provisions of educational amenities in the city, safe atmosphere for woman learning, starting of number of primary, secondary and higher education institutions out of which Some are exclusively for women during the last three decades.

TABLE NO.IV-XXXIII

NASHIK CITY: DIVISIONWISE LITERACY STRUCTURE

(YEAR 2001)

DIVISION NAME	Total Population	Literate Population	% to Total Division Population	Total Male Population	Total Literate Male Population	% Total Division Male Literacy	Total Female	Total Literate Female	% Total Division Female Literacy
NASHIK EAST	1,65,423	1,23,917	74.91	85,742	68233	79.58	79,681	55684	69.88
NASHIK WEST	1,23,481	98,171	79.50	63,899	52955	82.87	59,582	45216	75.89
PANCHA VATI	2,14,950	1,53,037	71.20	1,16,493	90234	77.46	98,457	62803	63.79
NASHIK ROAD	1,90,326	1,42,956	75.11	1,01,852	81902	80.41	88,474	61054	69.01
NEW NASHIK	2,14,256	1,61,596	75.42	1,14,906	91888	79.98	99,350	69,708	70.16
SATPUR	1,68,800	1,23,018	72.88	92,845	72793	78.40	75,955	50225	66.12
TOTAL	**10,77,236**	**8,02,695**	**74.51**	**5,75,737**	**4,58,005**	**79.55**	**5,01,499**	**3,44,690**	**68.73**

Source: - * Census of India, District census Handbook Nashik District, 2001.
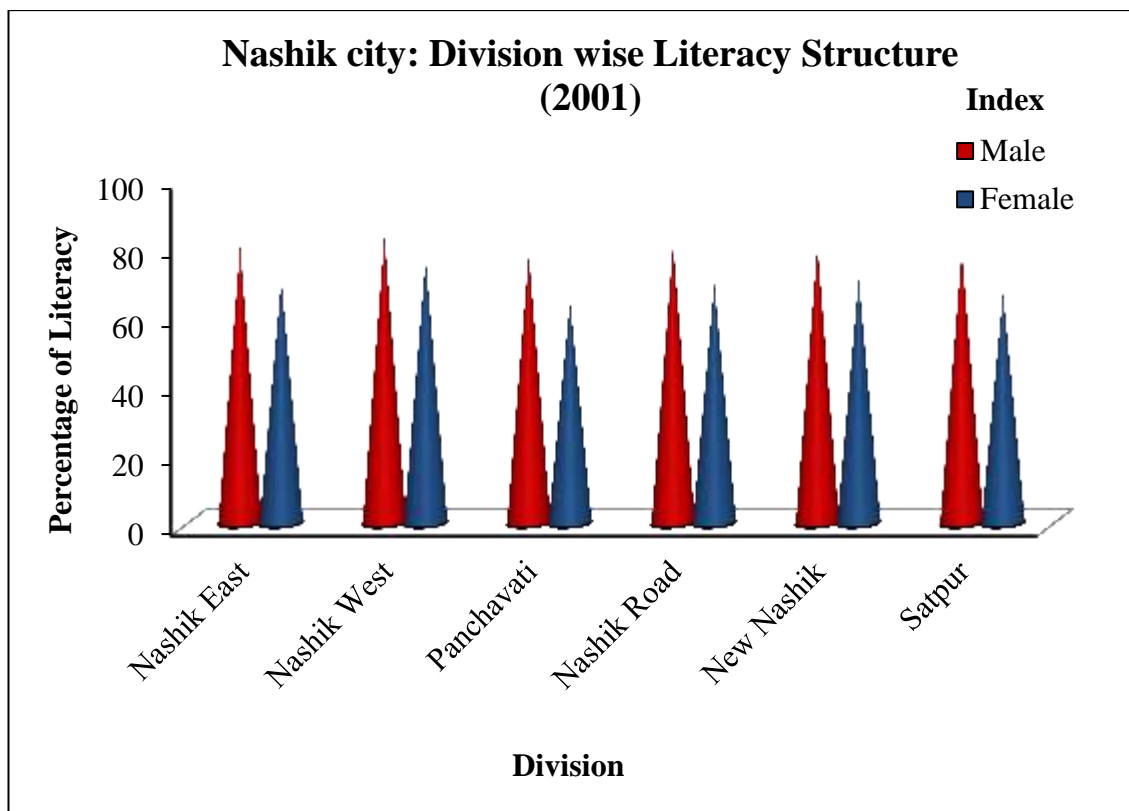
Fig. 4.61

According to 2001 census, the Nashik West division has the highest total literacy rate of 79.50 per cent while lowest literacy rate has noted in Panchavati division i.e. 71.20 per cent. The highest male literate rate of 82.87 per cent has been found in Nashik West division and lowest male literacy 77.46 per cent has been observed in Panchavati division. Only Panchavati division and Satpur division has the lowest male literate ratio than the average male literate i.e. 79.55 per cent. It is also observed that Nashik West division has been found the highest female literacy ratio and Panchavati division has noted lowest-female literacy rate i.e.75.89 per cent and 63.79 per cent respectively. Satpur and Panchavati divisions has lowest female literate rate than average the total literate is 68.73 per cent. Male literate having 74.51 per cent and female literate accounts for 68.73 per cent. There exists a more variation in the percentage of total literacy rate from division to division ranging from 71.20 per cent in Panchavati division to 79.50 per cent in Nashik West division (Table No. IV-XXXIII and Fig. 4.61).

TABLE NO.IV-XXXIV

NASHIK CITY: DIVISIONWISE LITERACY STRUCTURE

(YEAR 2011)

DIVISON NAME	Total Population	Literate Population	% of Total Division population	Total Male	Literate Male	% Total Division Male	Total Female Population	Total Literate Female	% Total Division Female
NASHIK EAST	237660	180645	76.01	125251	100364	80.13	112409	80281	71.41
NASHIK WEST	183813	151278	82.30	94785	78934	83.28	89028	72344	81.25
PANCHA VATI	287432	216374	75.28	150166	119382	79.50	137266	96992	70.61
NASHIK ROAD	242922	186567	70.80	126167	102523	81.23	116755	84041	71.98
NEW NASHIK	301660	234390	77.70	160720	130376	81.12	140887	104014	73.83
SATPUR	232619	176496	75.87	125428	100217	89.90	107191	76279	71.16
TOTAL	**1486053**	**1145747**	**77.10**	**782517**	**631796**	**80.72**	**703536**	**513951**	**73.05**

Source: - * Census of India, District census Handbook Nashik District, 2011.
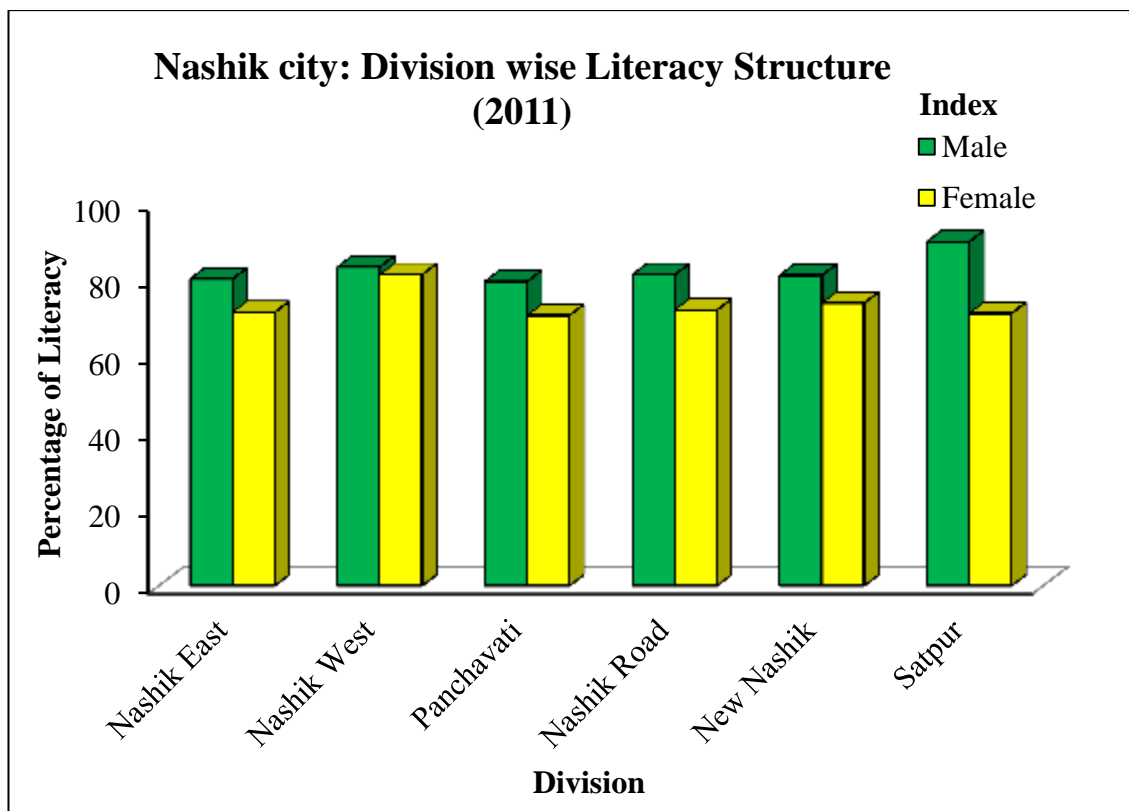
Fig. 4.62

According to 2011 census, the Nashik West has highest total literacy rate of 82.30 per cent while lowest literacy rate has been noted in Nashik road division i.e. 70.80 per cent. The highest male literate rate of 89.90 per cent has been found in Satpur division and lowest male literacy 79.50 per cent has been observed in Panchavati division. Only Panchavati division has the lowest male literate ratio than the average male literate i.e. 80.72 per cent. It has also been observed that Nashik West division has found highest female literacy ratio and Panchavati division has noted lowest-female literacy rate i.e.81.25 per cent and 70.61 per cent respectively. Nashik East, Panchavati, Nashik road and Satpur division has the lowest female literate rate than average the total literate is 73.05 per cent. Male literate having 80.72 per cent and female literate accounts for 73.05 per cent. There exists more variation in the percentage of total literacy rate from division to division ranging from 70.80 per cent in Nashik road division to 82.30 per cent in Nashik West division (Table No. IV-XXXIV and Fig. 4.62, Fig. 4.63, Fig. 4.64, and Fig. 4.65).

Fig. 4.63

Divisionwise Male Literacy Structure of Nashik City

(A) 1991-2001

Panchvati

Nashik West

Satpur

Nashik East

New Nashik

Nashik Road

Legend

Literacy in Percent

< 80

80 - 82

82 - 84

> 84

(B) 2001-2011

Panchvati

Nashik West

Satpur

Nashik East

New Nashik

Nashik Road

0   2   4 Km.

Fig. 4.64

Divisionwise Female Literacy Structure of Nashik City

(A) 1991-2001

Panchvati

Nashik West

Satpur

Nashik East

New Nashik

Nashik Road

Legend
Literacy in Percent
< 72
72 - 74
74 - 76
> 76

(B) 2001-2011

Panchvati

Nashik West
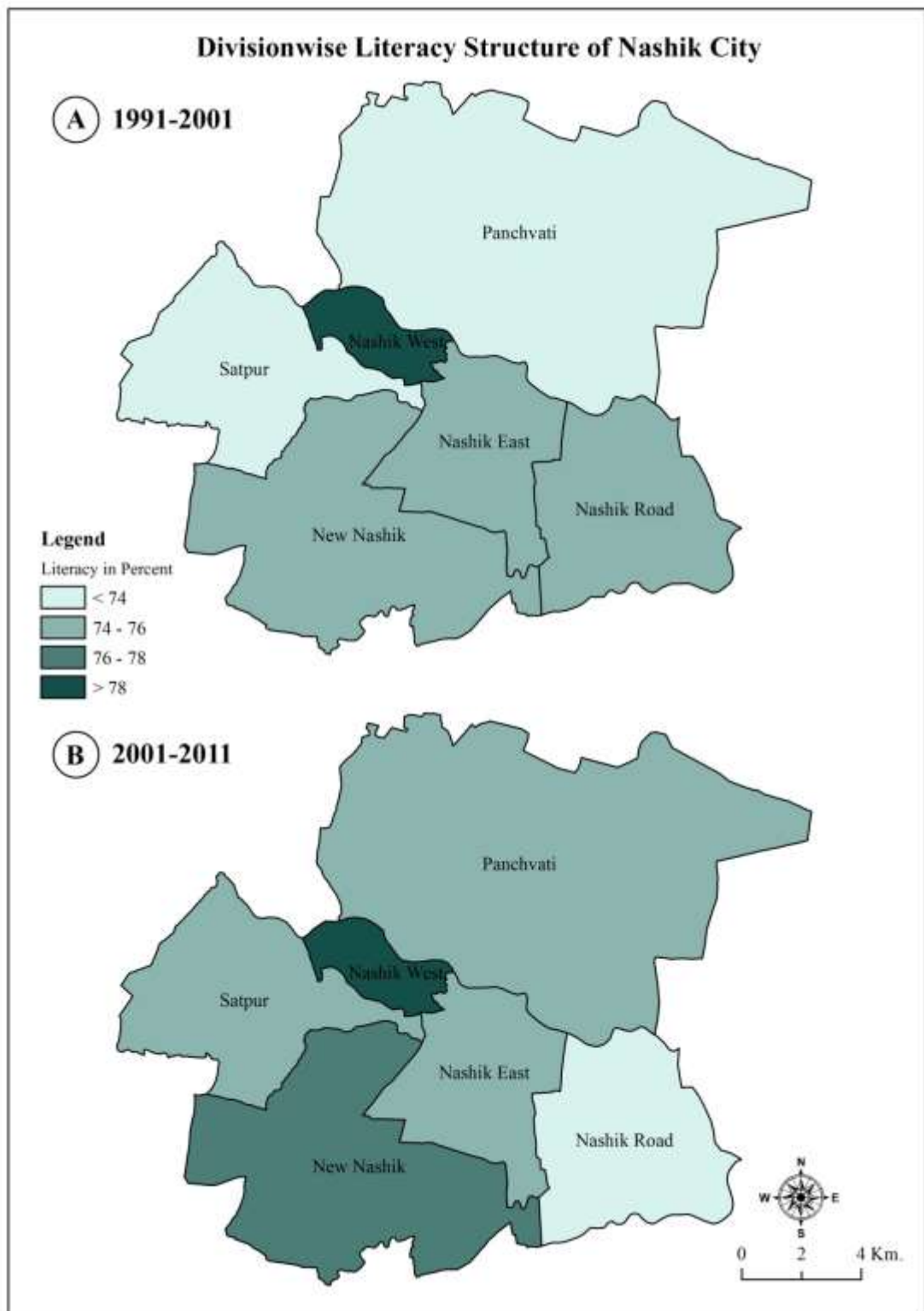
Satpur

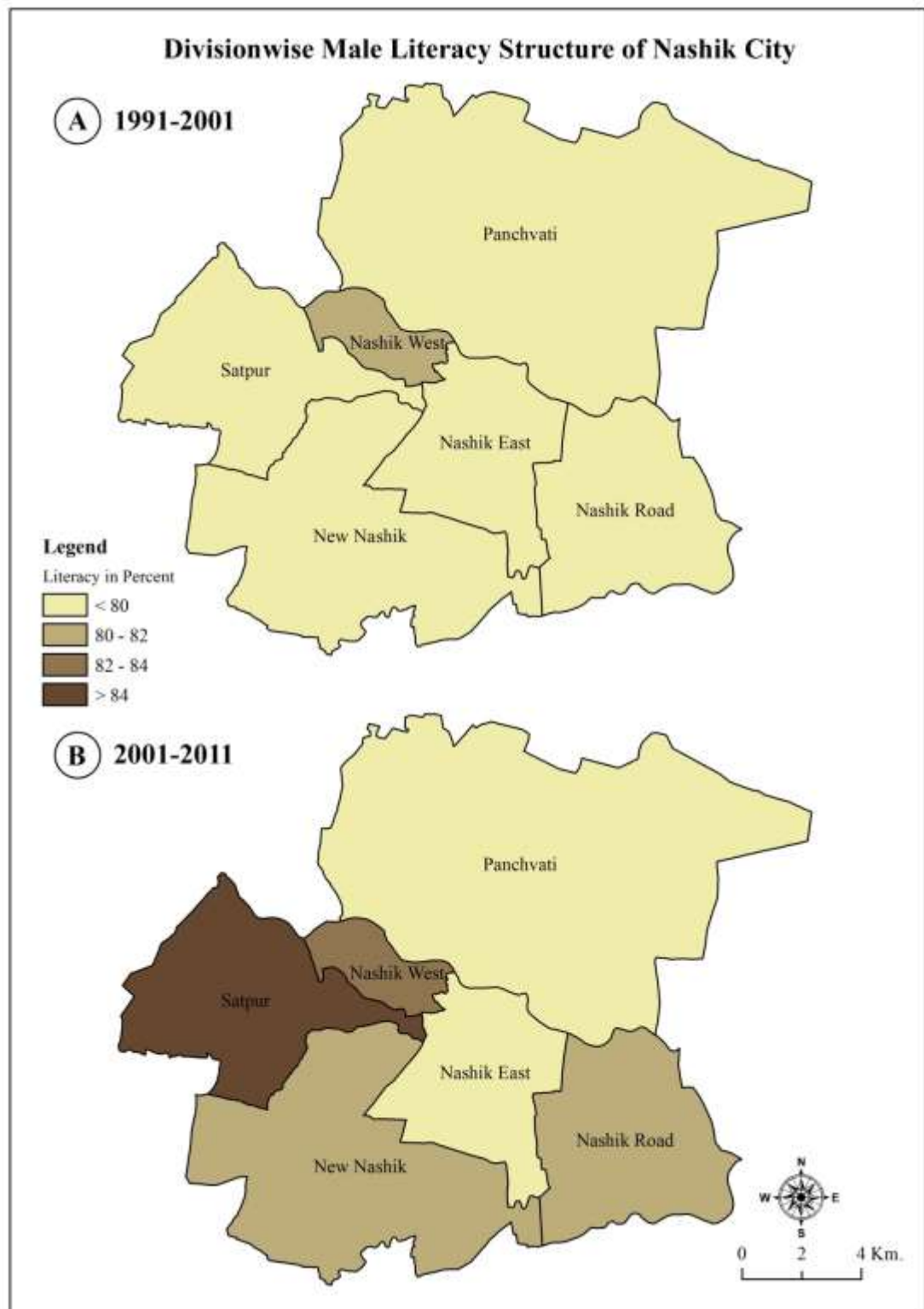Nashik East

New Nashik

Nashik Road
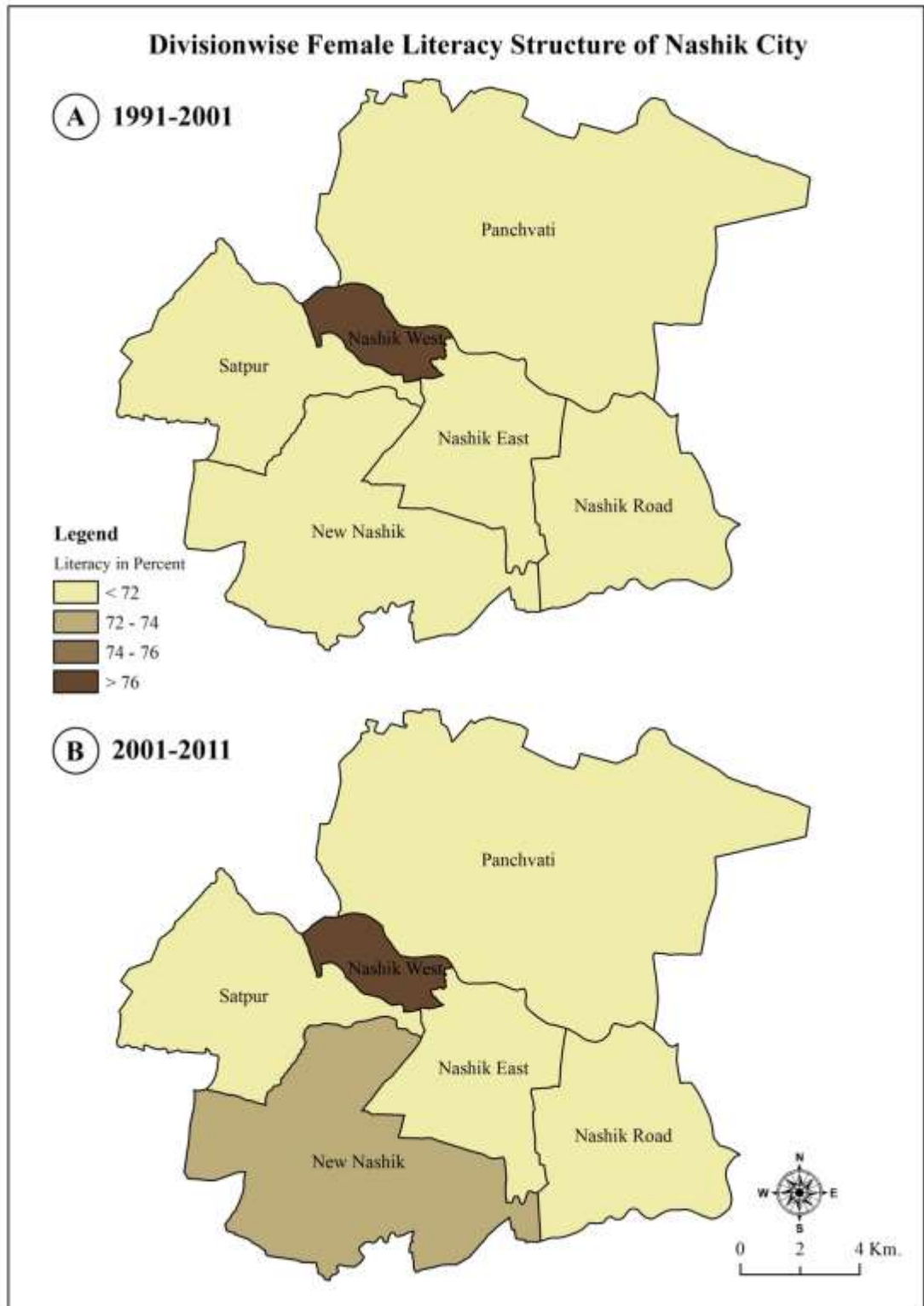
0   2   4 Km.

Fig. 4.65

4.36   SEX RATIO:

Sex ratio is an important factor to know urban character of the city in terms of occupational structure. Day by day the youth from agricultural sector turns towards urban sector due to undefined weather condition, life style and so many reasons. This migration tends effect on sex-ratio of the city. This effect has been seen in terms of marriage rate, death rate, birth rate and population growth. Only settled population looks towards marriage and birth rate but this all affect on affordable housing, standard of living, sharing of urban resources, urban structure. An analysis of the sex composition of Nashik city is of vital importance, it is not only shows growth of future population but also degree of population. Where the urban amenities goes on high-end in terms of money it affects lowering sex ratio because of high land cost, unavailing of affordable houses etc. people like to maintain their life style with same economy, ultimately it is effecting on lowering sex-ratio by curtail family size.

As compared to India and Maharashtra, study region has very low Sex- ratio. In 2001 sex-ratio was 933 and 922 for India and Maharashtra respectively while sex-ratio of Nashik city was 871 females per 1000 males. In 2011 sex-ratio was 943 for India and 929 for Maharashtra while sex-ratio of Nashik city was 899 females per 1000 males. Lower sex-ratio found in the city because migration of male working population from rural to urban area for the purpose employment.

TABLE NO.IV-XXXV

NASHIK CITY: SEX RATIO

(1971 TO 2011)

Sr. No.	Year	Male	Female	Total	Sex Ratio	Female % of Total Population
1	1971	92,792	83,299	1,76,091	898	47.30
2	1981	1,37,289	1,25,139	2,62,428	911	47.58
3	1991	3,47,422	3,09,503	6,56,925	891	47.11
4	2001	5,75,737	5,01,499	10,77,236	871	46.55
5	2011	7,82,517	7,03,536	14,86,053	899	47.34

Source: - Census of India, District census Handbook Nashik District, 1971, 1981, 1991, 2001 and 2011.

Nashik city: Sex Ratio
(1971 - 2011)
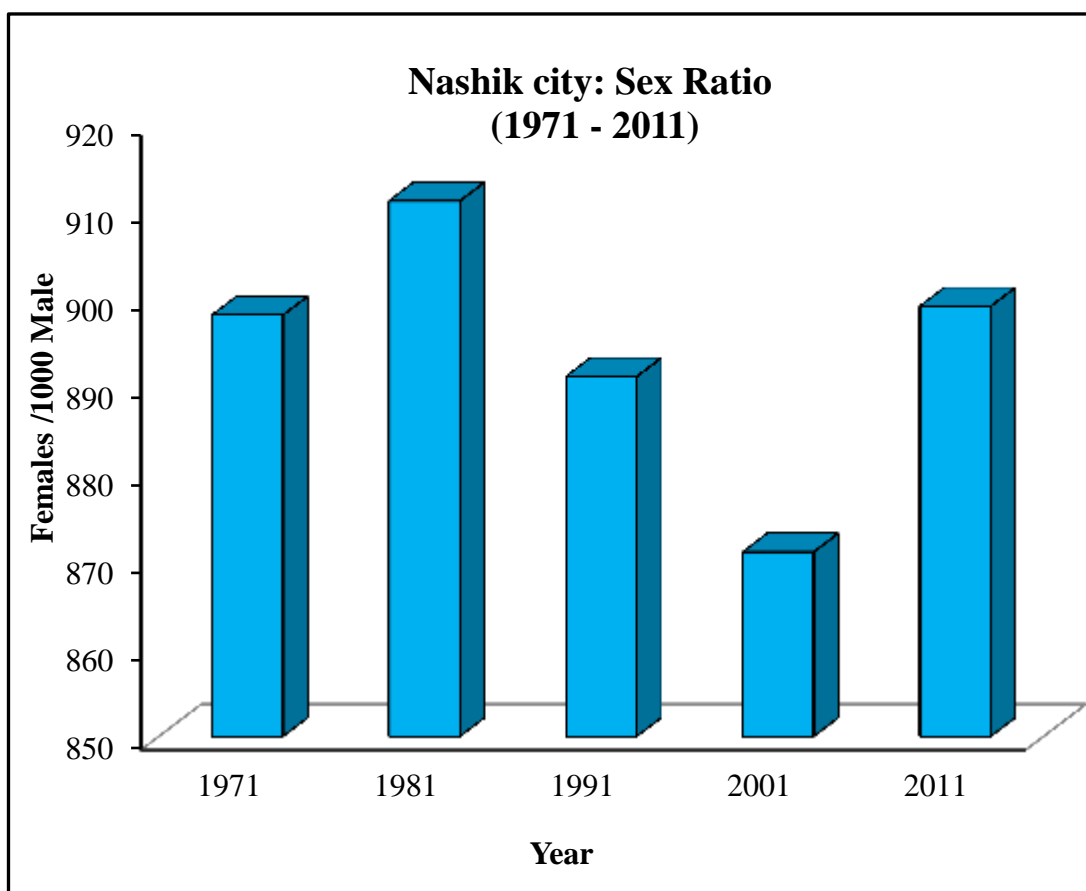
Fig. 4.66

It has been observed from the Table No. V-XXXV and Fig. 4.66 that there were 83,299 females against 92,792 males in 1971. This yields a ratio of 898 females against 1000 males. It has been observed that sex-ratio increased in the decade of 1981 i.e. 911 females per 1000 males. But sex ratio slightly decreased in 2011 decades, there were 7, 03,536 females against 7, 82,517 males which yields a ratio of 899 females against 1000 males. (Table No. IV-XXXV and Fig. 4.66)

The sex ratio of division wise and the city itself shows different picture because some divisions have higher sex-ratio. For the purpose of analysis here an attempt has been made to study the division wise sex-ratio from 2001 to 2011. The Table No. IV-XXXV gives us detail about the division wise sex ratio of the Nashik city.

TABLE NO.IV-XXXVI

NASHIK CITY: DIVISIONWISE SEX RATIO

(2001 TO 2011)

DIVISION NAME	2001				2011			
	Male	**Female**	**Total**	**Sex Ratio**	**Male**	**Female**	**Total**	**Sex Ratio**
NASHIK EAST	85,742	79,681	1,65,423	929	125251	112409	237660	897
NASHIK WEST	63,899	59,582	1,23,481	932	94785	89028	183813	939
PANCHAVATI	1,16,493	98,457	2,14,950	845	150166	137266	287432	914
NASHIK ROAD	1,01,852	88,474	1,90,326	869	126167	116755	242922	925
NEW NASHIK	1,14,906	99,350	2,14,256	865	160720	140887	301607	876
SATPUR	92,845	75,955	1,68,800	818	125428	107191	232619	854
TOTAL	**5,75,737**	**5,01,499**	**10,77,236**	**871**	**7,82,517**	**7,03,536**	**14,86,053**	**899**

Source: - Census of India, District census Handbook Nashik District,2001 and 2011.

Fig. 4.67

199
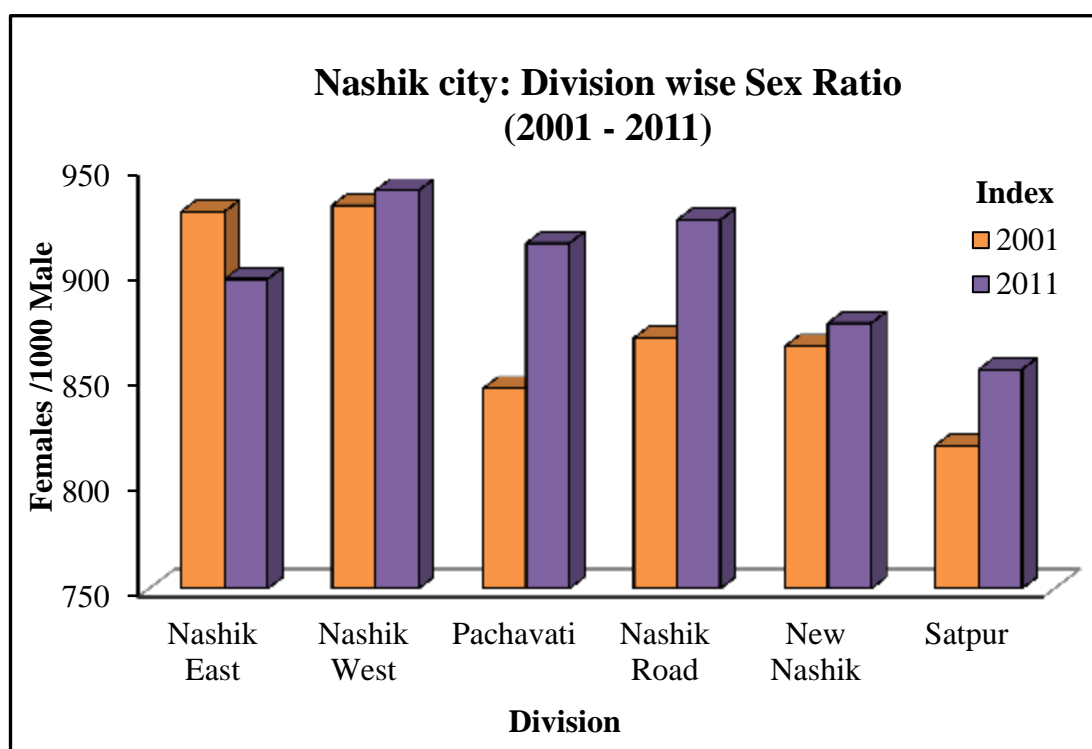
In the decade of 2001 highest sex ratio has been recorded in Nashik West division and lowest has been recorded in Satpur division. It has been observed in satpur division that the sex-ratio from 2001 to 2011 decade lower among all divisions because in Satpur division most of the part is occupied by industrial area so singular male working population has been observed more as compared to female. Also it has been observed that the increasing trend of sex-ratio has observed in Nashik west and Panchavati divisions i.e. 932 to 939 females per 1000 males and 845 to 914 females per 1000 males respectively since last two decade.

It has been observed from the Table No. IV-XXXVI and Fig. 4.67, Fig. 4.68 that higher sex-ratio in the decade of 2011 was recorded in Nashik west division and lowest was recorded in Satpur division. Sex-ratio indicates that Nashik East, Nashik West and Panchavati divisions has higher sex ratio than the average sex-ratio i.e. 899 females per 1000 males.
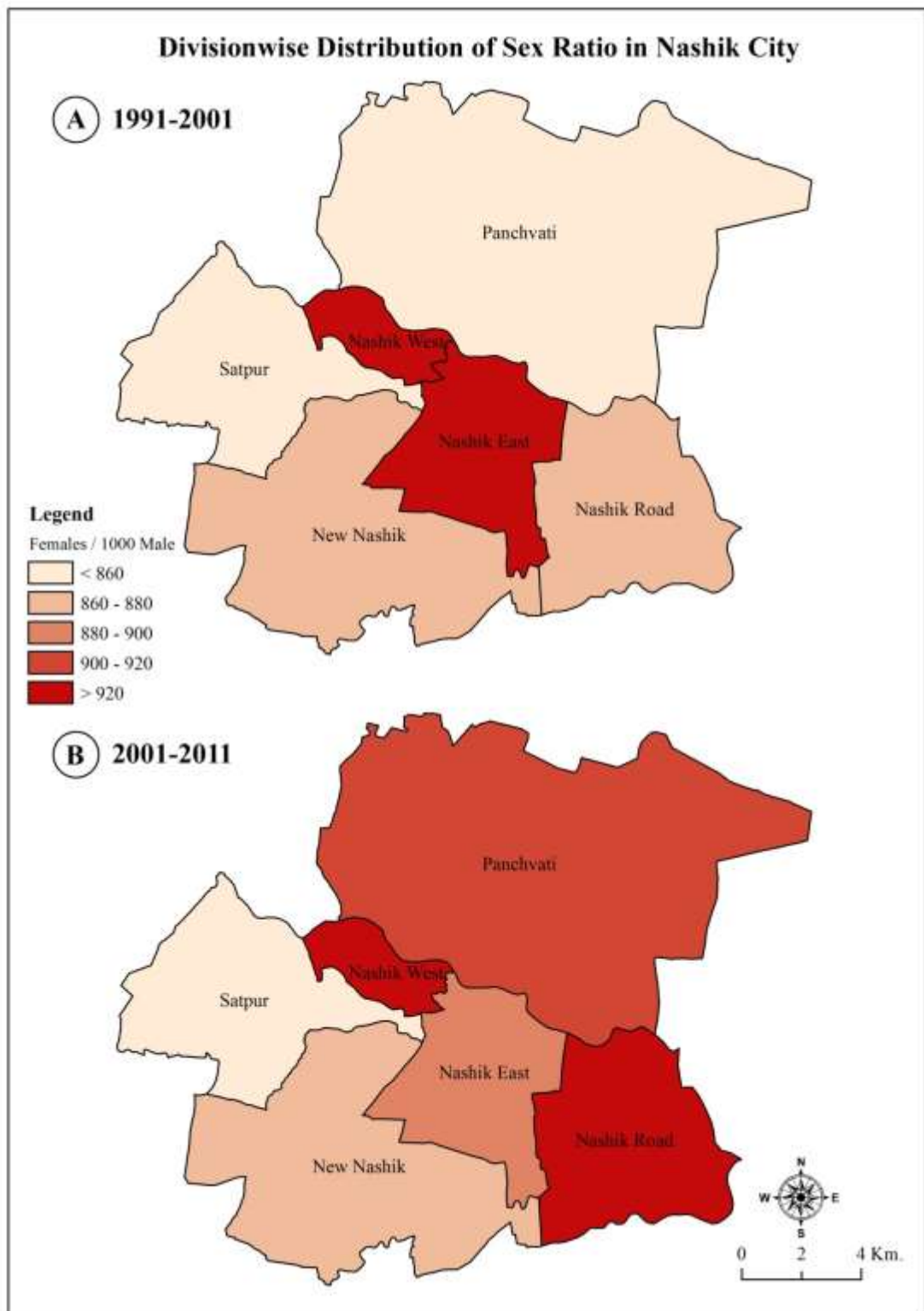
Fig. 4.68

4.37 OCCUPATIONAL STRUCTURE OF NASHIK CITY:

Occupational structure is inseparable part of the urban environment. This variety in occupational structure helps to improve economical and urban structure. As per census the occupation defined as, It is an earning activity done by man by involving him in any type of function (census India 1971).

A man who involving himself in earning activity of occupation structure which gives us working population of the city, the activity is of three types Primary, Secondary and Tertiary. The nos. from these activities defined as urban character of that city (Malik-1989).

Occupation structure also helps us to find out many life styles. It is helpful to define degree of employment or unemployment of the city. It also directly influence on social, economy, scientific study of population. It also effect on cultural trains of worker.

Therefore, it is essential to analyze the working force and its livelihood pattern for obtaining and understanding of diverse demographic, socio-economic relationships for making an assessment of manpower of the area. Here, an attempt has been made to study the occupational structure for the decade 1981, 1991, 2001 and 2011. The Table No. IV- XXXVII and Fig. 4.69, Fig. 4.70, Fig. 4.71 and Fig. 4.72 gives us details about the occupational structure of the Nashik city.

NASHIK CITY: OCCUPATIONAL STRUCTURE

(1981 TO 2011)

Sr. No.	Categories of the workers	1981	1991	2001	2011
1	Total number of working force	74,477	2,01,287	3,71,423	7,13,305
2	Total male workers	64,297	1,67,843	3,02,851	5,36,048
3	Total female workers	10,180	33,444	68,572	1,77,257
4	Marginal workers				
	Total	1,540	3,397	23,734	57,064
	Male	678	1,255	12,848	31,385
	Female	862	2,142	10,886	25,679
5	Percentage to Total worker in.				
	i) Primary.	12.30	13.06	15.20	22.00
	ii) Secondary.	30.18	37.86	39.00	38.45
	Iii) Tertiary.	55.45	47.43	39.41	37.55
	iv) Marginal workers.	02.07	01.65	06.39	8.0
6	Percentage of Male workers to total workers.	86.31	83.38	81.54	66.56
7	Percentage of Female workers to total workers	13.67	16.61	18.46	33.44
8	The labour participation ratio.	28.37	30.64	34.48	48.00

Source: -Census of India, District census Handbook Nashik District, 1981, 1991 2001 and 2011.

The labour participation ratio for total workers is defined as the percentage of total workers to total population. For Nashik city the labour participation ratio was 28.37 per cent in 1981 and it has increased up to 48.00 per cent in 2011. In the year 1981 nearly 86.31 per cent of total working population was male workers and female workers were only 13.67 per cent. It has been observed that percentage of male working population has decreased up to 66.56 per cent while the female working population has increased up to 33.44 per cent in 2011. (Table No. IV- XXXVII and Fig. 4.73).

Fig. 4.69

Fig. 4.70

Nashik city: Occupational Structure (2001)

Index

■ Primary   ■ Secondary   □ Tertiary   ■ Marginal Workers

Fig. 4.71

Nashik city: Occupational Structure (2011)

■ Primary   ■ Secondary   □ Tertiary   ■ Marginal Workers

Fig. 4.72

205
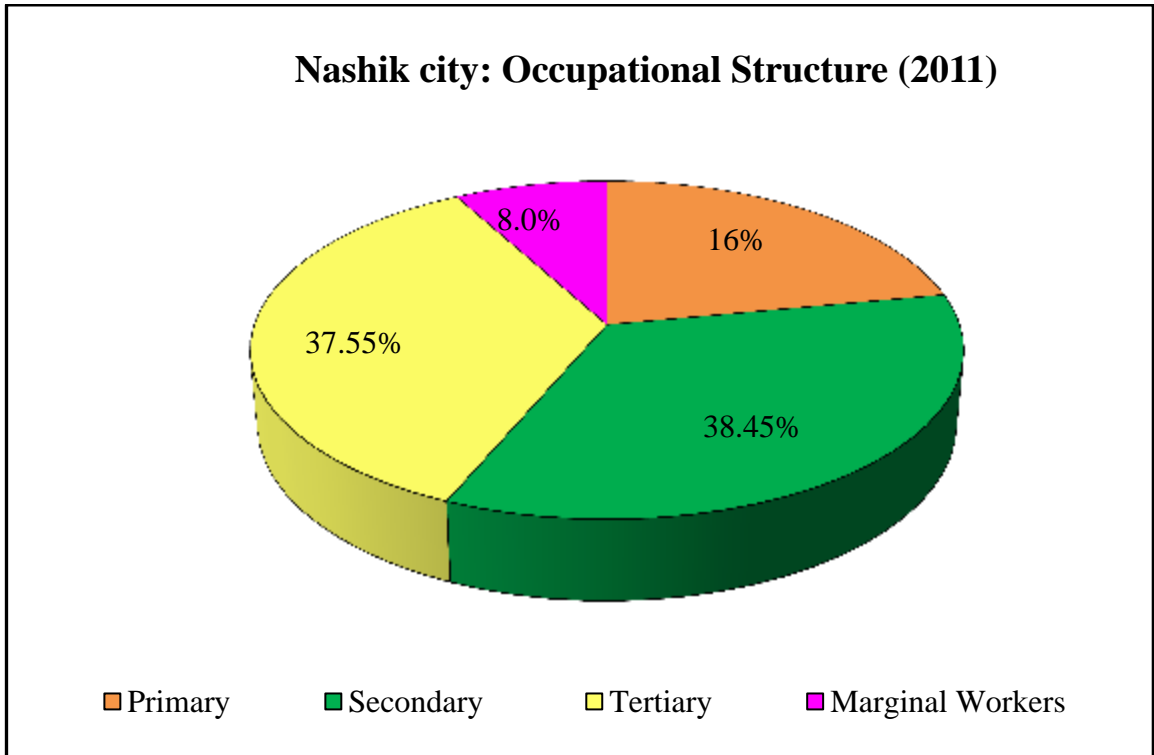
It has been observed from the Table No.IV- XXXVII and Fig. 4.69, Fig. 4.70, Fig. 4.71 and Fig. 4.72 that percentage of total working population has been increased in every decade from 1981 to 2011. The analysis also clearly indicates that the share of total working population of male has found decreased and female working population has increased. It has been observed that primary sector has increased from 12.30 per cent in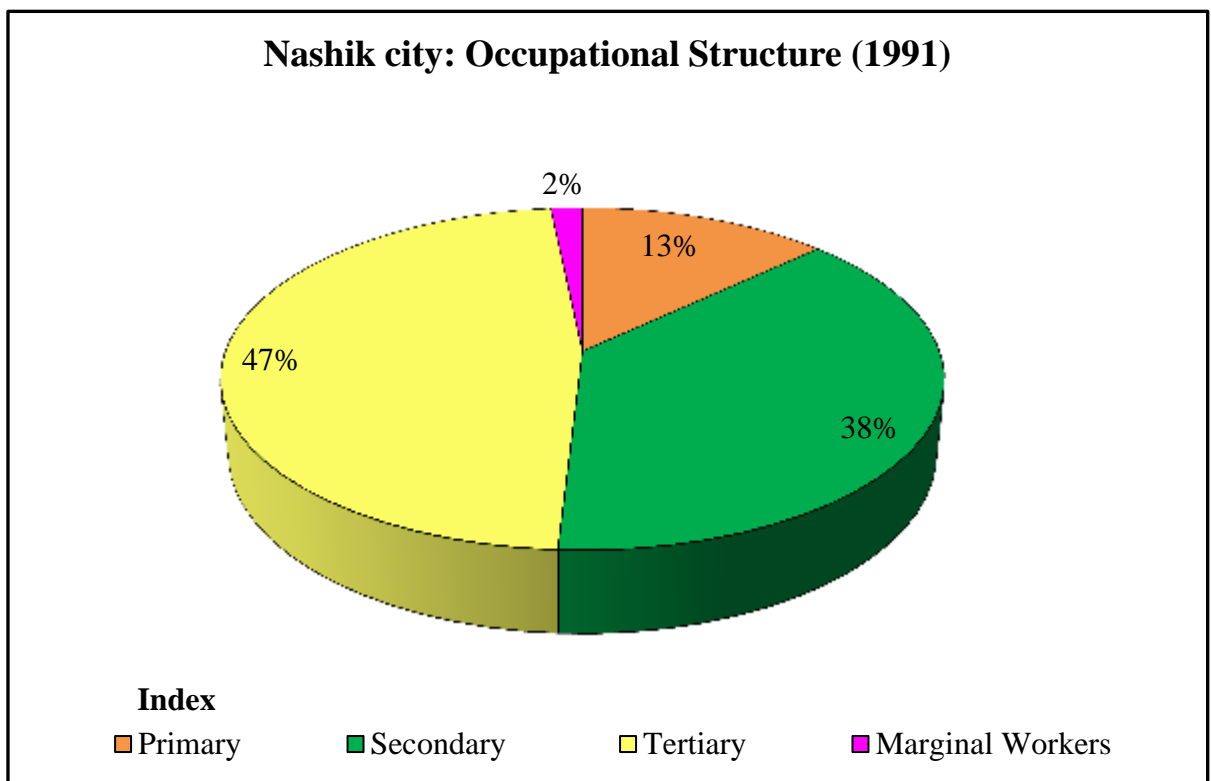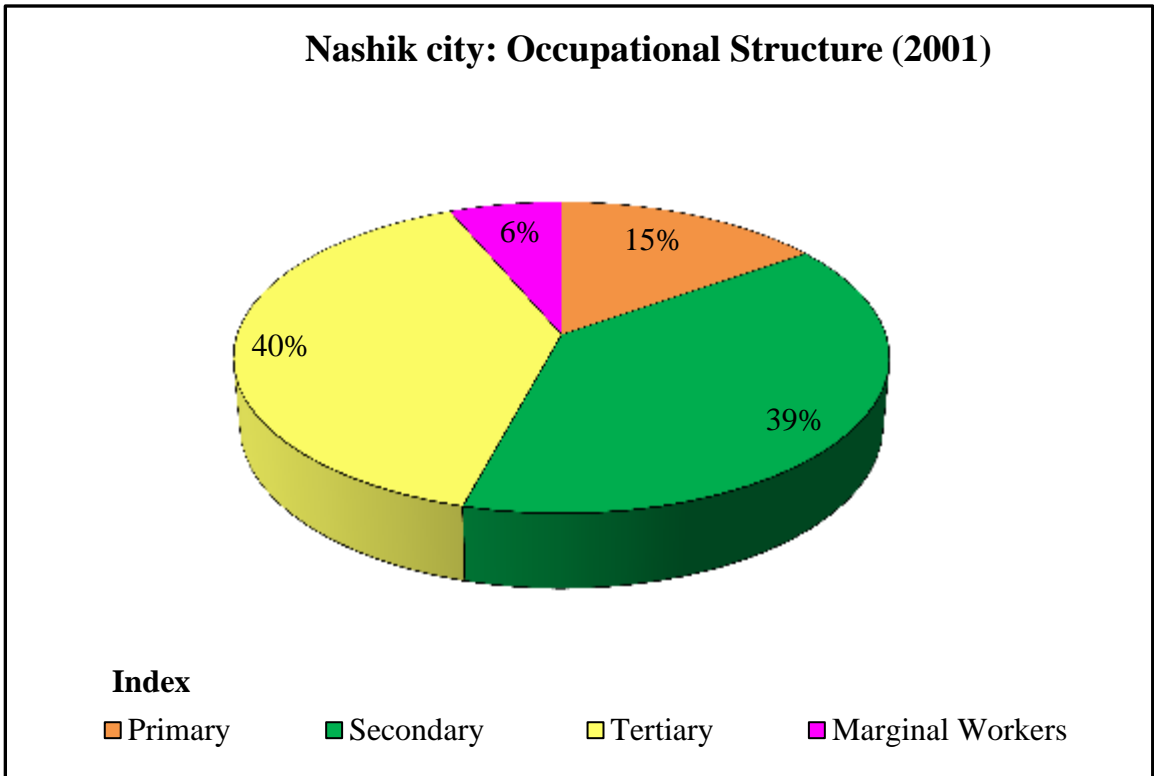 1981 to 22.00 per cent in 2011. It is conformed from the Table No. IV- XXXVII and Fig. 4.69, Fig. 4.70, Fig. 4.71, Fig. 4.72 that the percentage of workers in primary sector is not important for urban growth point of view. In the secondary sector, the percentage of workers in 1981 was 30.18 per cent which was increased up to 38.45 per cent in 2011 because of various industrial units has been established in Nashik city.

The percentage of workers in tertiary sector has higher than those of primary and secondary sectors. It has been observed that percentage workers in tertiary sector were 55.45 per cent in 1981 but it has decreased up to 35.55 per cent in 2011. This decreased in percentage of tertiary sector because of percentage of marginal workers in this sector has increased. The percentage of marginal workers in 1981 was 02.07 per cent; it has increased up to 8.0 per cent in 2011. The increasing trend in marginal workers will create problems of unemployment within city.

Fig. 4.73

TABLE NO.IV-XXXVIII

NASHIK CITY: MALE AND FEMALE OCCUPATIONAL STRUCTURE

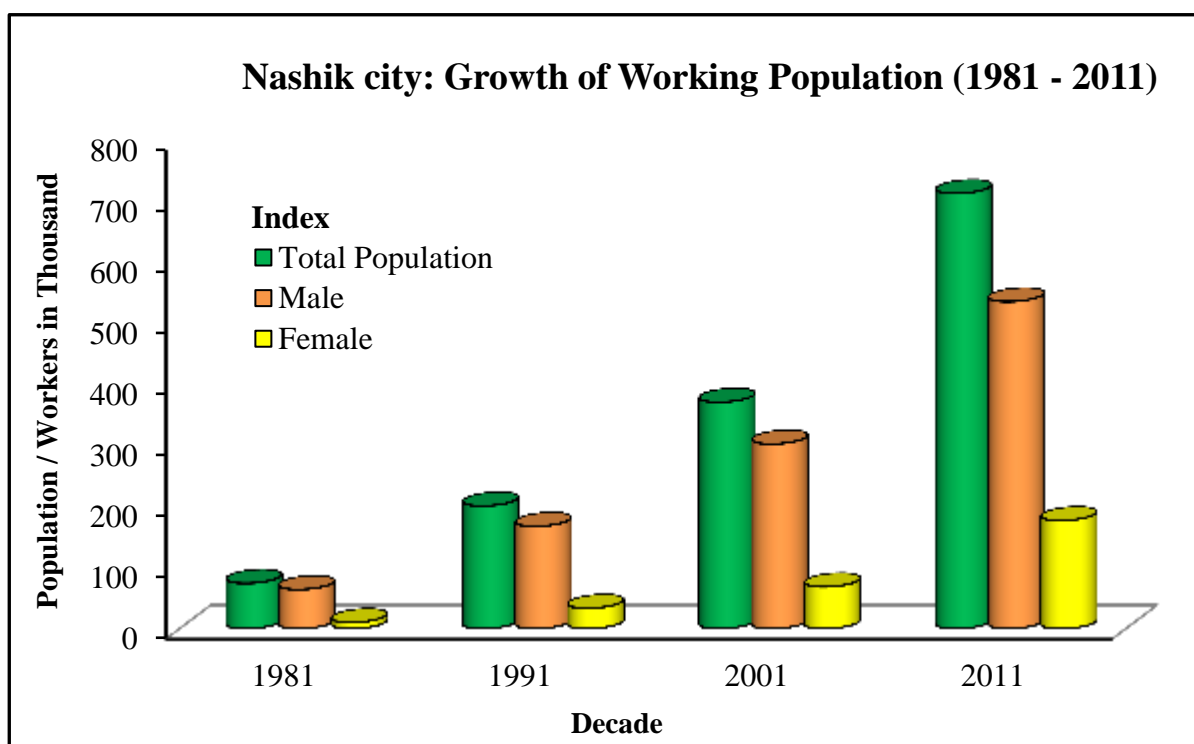**(2001)**

Sr.No	Occupation	Male Workers	Female Workers	Total	% of Total Workers
1	Cultivators.	8455	4840	13295	03.58
2	Agricultural laborers.	4373	4381	8754	02.36
3	Household Industries, Manufacturing, Processing, Servicing and Repairs.	2796	2108	4904	01.32
4	Other Workers.	274379	46357	320736	86.35
5	Total main workers.	290003	57686	347689	----
6	Marginal workers.	12848	10886	23734	06.39
7	Total workers.	302851	68572	371423	100
8	Total Non-workers.	272886	432927	705813	
9	**Total.**	**575737**	**501499**	**1077236**	

Source: - Census of India, District census Handbook Nashik District, 2001

The Table No. IV-XXXVIII Fig. 4.74 and Fig. 4.75 show the occupational structure of the decade 2001. Out of total population 10, 77,236, the total number of workers in all categories including marginal workers are 3,71,423 persons out of which 3,02,851 are males and 68,572 are females. The percentage of workers in primary, secondary and tertiary sector as per 2001 census are 15.00 Per cent, 39.00 per cent and 39.41 per cent respectively. The percentage of total workers to total population is 34.48 per cent, out of which 81.54 per cent are males and 18.46 per cent are females. It has observed that, the majority of the workers are engaged in secondary and tertiary activities. The total percentage of workers in these two sectors during 2001 was 78.41 per cent. This indicates the urban character of the study area.

Nashik city: Male and Female Occupational Structure (2001)

Note : HIMPSR = Household Industries, Manufacturing, Processing, Servicing and Repairs

Fig. 4.74

Nashik city: Male and Female Occupational Structure (2001)

Note : HIMPSR = Household Industries, Manufacturing, Processing, Servicing and Repairs
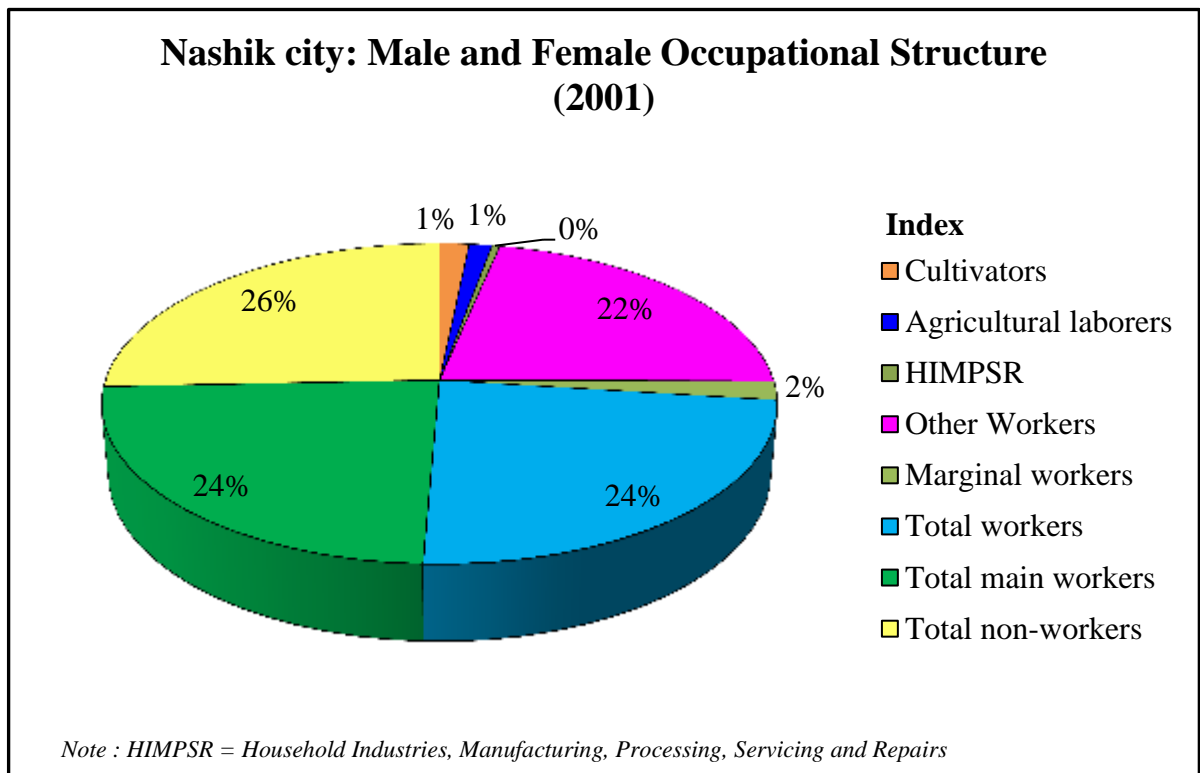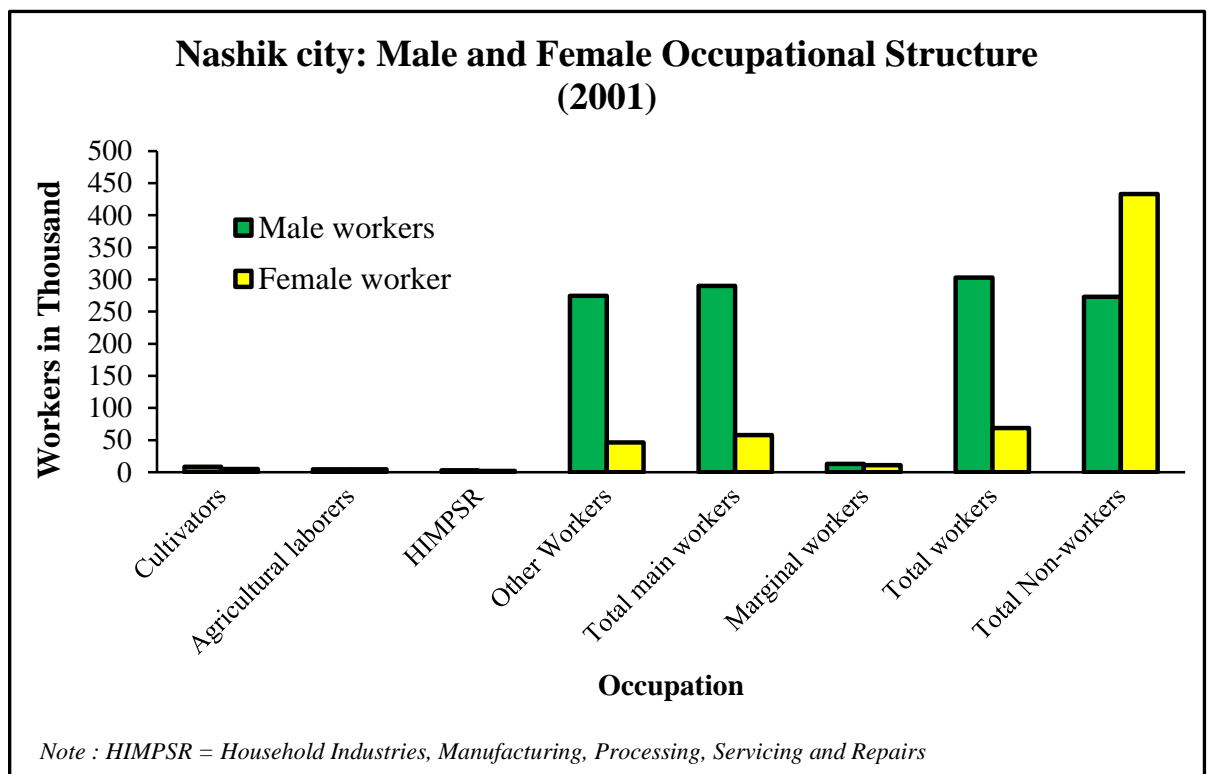
Fig. 4.75

TABLE NO.IV-XXXIX

NASHIK CITY: MALE AND FEMALE OCCUPATIONAL STRUCTURE

(2011)

Sr. No.	Occupation	Male Workers	Female Worker	Total	% of Total Workers
1	Cultivators.	30025	19150	49075	6.88
2	Agricultural laborers.	19050	19040	38090	5.34
3	Household Industries, Manufacturing, Processing, Servicing and Repairs.	10126	2572	12698	1.78
4	Other Workers.	514919	141322	656241	92.00
5	Marginal workers.	21129	35935	57064	8.00
6	Total workers.	474811	238494	713305	100
7	% Total workers campers total population.	474811	238494	713305	48
8	Total non-workers.	307706	465042	772748	52.00
9	**Total.**	**7,82,517**	**7,03,536**	**14,86,053**	**100**

Source: - Census of India, District census Handbook Nashik District, 2011.

Table No. IV-XXXIX Fig. 4.76 and Fig. 4.77 show the occupational structure of the Nashik city for the decade 2011. The total no. of workers in all categories including marginal workers account for 7, 13,305 person out of which 4, 74,811 are male and 2, 38,494 are females. From the available data the per cent of workers in primary, secondary and tertiary sectors to total main workers are 16.00 per cent, 38.45 per cent and 37.55 per cent respectively. The percentage of male and female workers to total workers is 66.56 percent and 33.44 respectively. The labour participation ratio works out to 48.00 percent which shows increasing urban character of Nashik city.

Nashik city: Male and Female Occupational Structure (2011)

Index
- Cultivators
- Agricultural laborers
- HIMPSR
- Other Workers
- Marginal workers
- Total workers
- Total main workers
- Total non-workers

1% 1% 0%
26%
22%
2%
24%
24%

Note : HIMPSR = Household Industries, Manufacturing, Processing, Servicing and Repairs

Fig.4.76

Nashik city: Male and Female Occupational Structure (2011)

■ Male workers
□ Female worker

Workers in Thousand

Occupation

Note : HIMPSR = Household Industries, Manufacturing, Processing, Servicing and Repairs

Fig. 4.77

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NASHIK CITY: SECTORWISE OCCUPATIONAL STRUCTURE

(2011)

Sr. No	Occupation	Male Workers	Female Workers	Total	% Total Workers
1	**Primary Sector.**				
	Cultivators.	30025	19050	49075	6.88
	Agricultural laborers.	19050	19040	38090	5.34
	Livestock, Forestry, Fishing, Hunting and Plantation, Orchards and allied activities.	10126	2572	12698	1.78
	Mining and Quarrying.	11177	3089	14266	2.00
	Total of Primary Sector	70378	43751	114129	16.00
2	**Secondary Sector.**				
	Manufacturing, Processing, Servicing and Repairs in Household Industry.	12850	12401	25251	3.54
	Manufacturing, Processing, Servicing and Repairs in other than Household Industry.	110245	37480	147725	20.71
	Constructions.	70148	31142	101290	14.20
	Total of Secondary Sector	193243	81023	274266	38.45
3	**Tertiary Sector.**				
	Trade and Commerce.	50031	30216	80247	11.25
	Transport, Storage andcommon	39410	2532	41942	5.88
	Other Services.	100620	45037	145657	20.42
	Total of Tertiary Sector	190061	77785	267846	37.55
4	**Total main workers.**	474811	238494	713305	
	Marginal workers.	21129	35935	57064	8.00
	Total working force.	474811	238494	713305	48.00
	Total non-workers.	307706	465042	772748	52.00
	Total.	**782517**	**703536**	**1486053**	**100**

Source: - * Census of India, District census Handbook Nashik District, 2011.

Naashik city: Sectorwise Occupational Structure (2011)

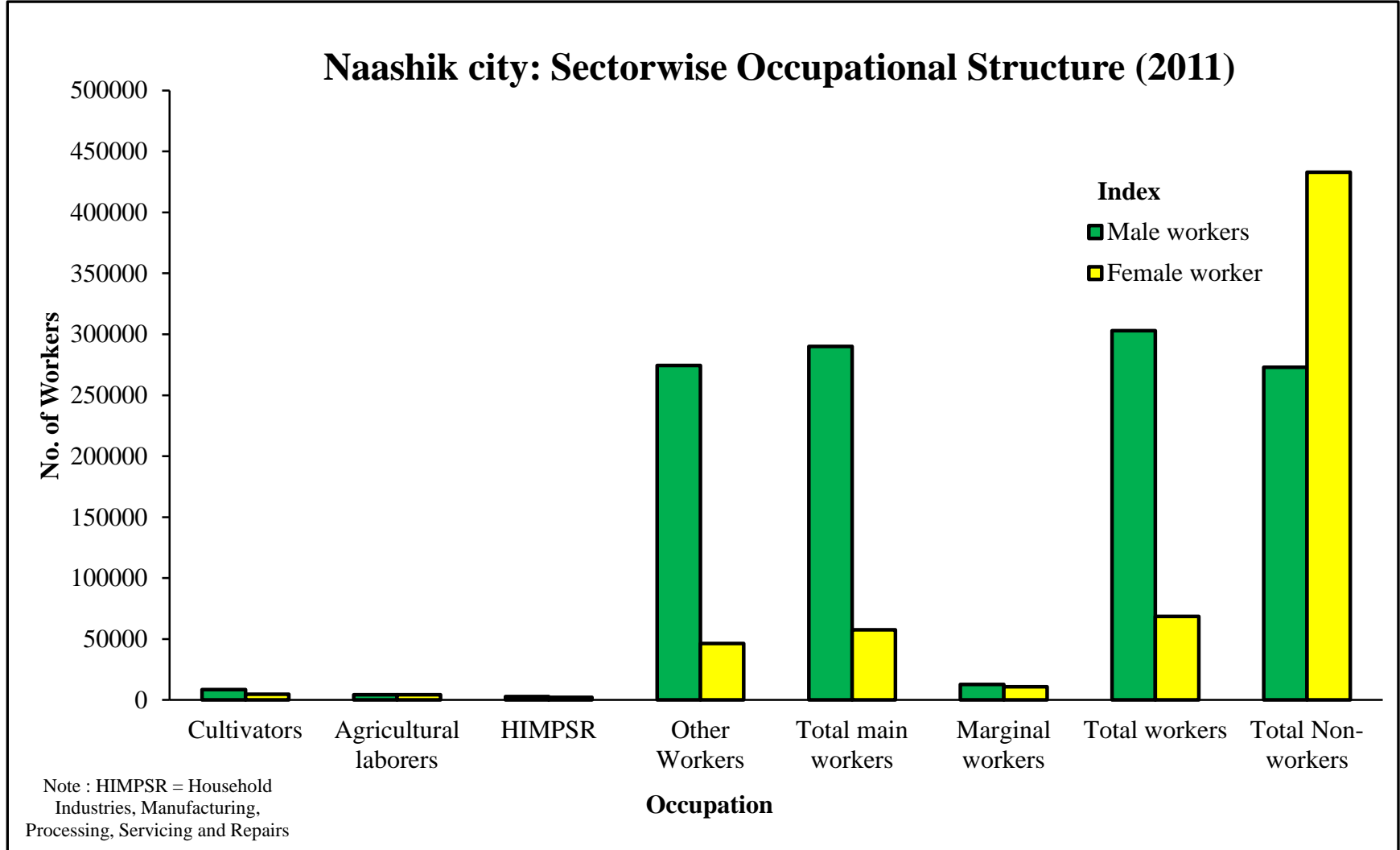Note : HIMPSR = Household Industries, Manufacturing, Processing, Servicing and Repairs

Fig. 4.78

It has observed from the Table No. IV-XL and Fig. 4.78 that, the total number of workers in all categories including marginal workers in 2011 are 7,13,305 nos., i.e. 48.00 per cent of total population 14,86,053, Out of which 5,36,048 persons are males and 1,77,257 are females. The percentage of primary, secondary and tertiary sectors as per 2011 census is 16.00 per cent, 38.45 per cent, and 37.55 per cent respectively. The percentage of male and female workers to the total workers is 75.15 per cent and 24.85 per cent respectively. It is observed from Table No. IV-XL and Fig. 4.78 that out of total male and female workers participation women participation is very less but increasing sharply. The labour participation ratio works out of 48.00 per cent as per 2011 census which is considered good and shows increase in urban character of the Nashik city.

4.38   MEASURES OF POPULATION CHANGES:

There are different measures to determine the growth of urban population. The growth of urban population of region during a given period of time may be explained as (I) absolute, (II) Percentage growth (III) rate of growth and so on. The absolute growth of urban population shows the amount of net increasing in a particular period. It throws light on the magnitude of problems arising out of the extra number of the people in the city, for whom urban amenities will be provided., on the other hand, the rate of urban growth provides a good index for comparative studies and at the same time examines the speed at which the process of urbanization is taking place. (Zodage, 2001)

The rate of population growth of Nashik city has been calculated with help of Gibb's formula (1966)(Ibid)

$$r = \frac{(P_2 - P_1) \div t}{(P_2 - P_1) \div 2} \times 100$$

Where, r = annual growth rate.

P_1 = population of the initial period of time.

P_2 = population of the latter period.

t = time interval of P_1 and P_2

It has observed from the Table No. IV-XXV and Fig. 4.49 that, the index of change in the Percentage of population size is changing, annual changes of population is considered, that it shows increased trend from decade 1901 to 1921 i.e. 3.33 per cent in 1901 and 2.38 per cent in 1921 and decreased trend from the decade

1931 to 1961 1.79 per cent in 1931 and 2.99 per cent in 1961. Again the increased trend has been observed from the decade of 1961 i.e. 5.97 per cent, 3.94 per cent in 1981, 8.58 per cent in 1991, 4.85 per cent in 2001and 10.99 per cent in 2011.

The annual change in population has been found higher in the decade 1991, which has sharply decreased in the decade 2001. In the decade 1991, the annual growth rate was 8.58 per cent, which has sharply decreased up to 4.85 in 2001. In the decade 1951 the annual growth rate was 5.97 which has been sharply decreased up to 2.99 in 1961. It has observed that the lowest annual change in population has found in the decade 1941 (i.e. 1.35 per cent) and second lowest in 1931 (i.e. 1.79 per cent). In the study region the highest growth rate is found in the decade 1991 because of the growth of urban areas which is expanding into various colonies and migration from rural areas to urban areas for the purpose of employment.

Here an attempt has been made to measure the inter-censual change in population with the help of following formula.

$$IC \quad \dfrac{P_1}{P_2}$$

Where,

P_1= population of the last year.

P_2 = population of the first year.

I_C = Inter censual change.

With the help of these indices Table No. IV-XXV and Fig.4.48, it is observed that the lowest population growth index is found in the year 1941 decade. Changes has found from 40.06 Per cent to 63.98 Per cent which is observed very irregular because of immigration from rural areas. From the decade 1901 to 2001 there are various ups and downs found in population growth of study region.

4.39   POPULATION PROJECTION:

Population projection is neither estimates nor-forecast nor foretelling but in between forecast and predictions. This would help in Population projection to urban geographers and to the planners in respect of (future growth of population) infrastructure and social service would be required for the projected population.

There are various methods applied for the population projection. Population projection of Nashik city has been calculated with the help of following methods. (CDP of Nashik)

1. **Arithmetical Increase Method:**

$$P_n = P_0 + P_2 + N$$

Where, P_n = future population.

P_o = population of last decade.

P_2 = average increase in per

N = number of decade.

Sr.No.	Year	Population	Increment
1	1971	1,76,091	-----
2	1981	2,62,428	86,337
3	1991	6,56,925	3,94,497
4	2001	10,77,236	4,20,311
5	2011	14,86,053	4,08,817
		Total	1309962
Total Average = 1309960 / 4 = 327490.5			
		Total Average	3,27,490.5

$P_n = P_0 + (P_2 \times N)$

Population Forecast for year 2021 is

P_{2021} = 1486053 + (327490.5 x 1) = **18, 13,544**

P_{2031} = 1486053 + (327490.5 x 2)= **21,41,034**

P_{2041} = 1486053 + (327490.5 x 3) = **24,68,525**

2. **Incremental Increase Method.** (Sinha,1970)

$$P_n = Po + P2 + (N \times ID)$$

Where, P_{n} = future population.

P_o = population of last decade.

P_2 = average increased in period.

N = number of decade

ID = average incremental increase in the period.

Sr.No.	Year	Population	Increment	Incremental increase
1	1971	1,76,091	-----	-----
2	1981	2,62,428	86,337	-----
3	1991	6,56,925	3,94,497	3081160
4	2001	10,77,236	4,20,311	25814
5	2011	14,86,053	4,08,817	-11494
	Total		1309962	322480
Increment Average (P_2) = 1309960 / 4 = 327490.5				
Increment Average (ID) = 322480 / 4 = 107493				
	Total Average		3,27,490.5	1,07,493

$P_n = P_o + (P_2 \times N) + \{N(N+1)/2\} \times ID)$

$P_{2021} = 1486053 + (327490.5 \times 1) + \{1(1+1)/2\} \times 107493$

$= \mathbf{19,21,037}$

$P_{2031} = 1486053 + (327490.5 \times 2) + \{2(2+1)/2\} \times 107493$

$= \mathbf{24,63,513}$

$P_{2041} = 1486053 + (327490.5 \times 3) + \{3(3+1)/2\} \times 107493$

$= \mathbf{31,13,482}$

3. **Geometrical Increase Method.**

$P_t = P_0 (1 + K)^N$

Where, P_t = population at some time in the future

P_o = present or initial population

K = average percentage increase (geometric mean)

N = period of projection in decade

Sr.No.	Year	Population	Increment	Geometrical Increase
1	1971	1,76,091	-----	
2	1981	2,62,428	86,337	0.49
3	1991	6,56,925	3,94,497	1.50
4	2001	10,77,236	4,20,311	0.64
5	2011	14,86,053	4,08,817	0.38
	Total		1309962	0.18

Note:-Geometrical Increase $\quad$ = 86337 / 176091 = 0.49…..

$\qquad\qquad\qquad\qquad\qquad$ = (0.49 x 1.50 x 0.64 x 0.38)

$\qquad\qquad\qquad\qquad\qquad$ = **0.18**

Geometrical Increase mean (K) $\quad$ = $(0.18)^{1/4}$ = **0.65**

$P_t \qquad = P_0 (1 + K)^n$

$P_0 \qquad$ = 1486053, **K** = 0.65 ,**n** = No. of Decade

$P_{2021} \qquad = 1486053 \times (1+0.65)^1$ **(n = 1, since1 decade)**

$\qquad\qquad$ = **25,51,987**

$P_{2031} \qquad = 1486053 \times (1+0.65)^2$ **(n = 2, since2 decade)**

$\qquad\qquad$ = **40,45,780**

$P_{2041} \qquad = 1486053 \times (1+0.65)^3$ **(n = 3, since3 decade)**

$\qquad\qquad$ = **66,75,536**

TABLE NO.IV-XLI

NASHIK CITY: POPULATION PROJECTION

(2021, 2031 AND 2041)

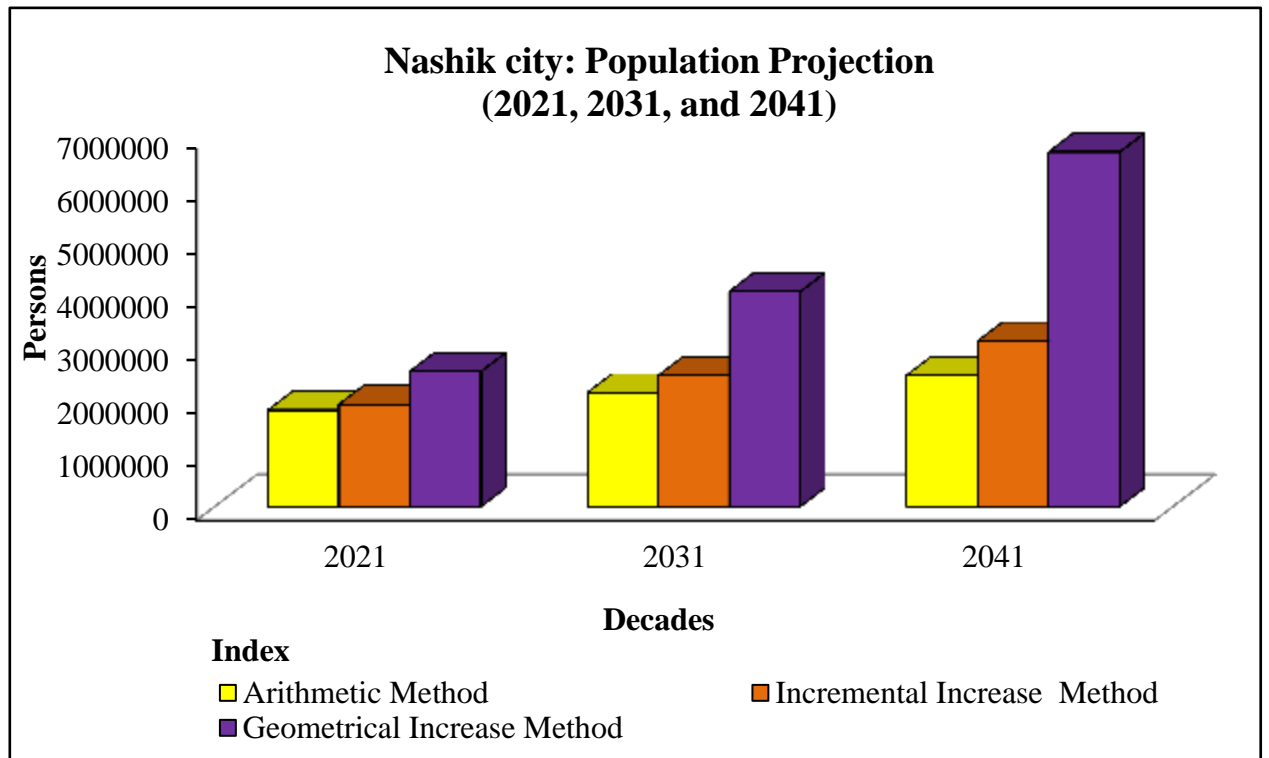| Sr. No.	Methods of population Projection	Projected population		
		2021	**2031**	**2041**
1.	Arithmetic Method	18,13,544	21,41,034	24,68,525
2.	Incremental Increase method	19,21,037	24,63,513	31,13,482
3.	Geometrical increase method	25,51,987	40,45,780	66,75,536

Source: - Compiled by Author.

Fig. 4.79

Table No. IV-XLI and Fig. 4.79 shows the population projection by different methods. It has observed that result of different method of the population projection was not same. For every day city planning, anticipation of future population is necessary.

CHAPTER - V

SUMMARY,CONCLUSION AND

SUGGESTIONS

5.0 SUMMARY

In any town or city, the proportion of the residing population brought about by migration of rural populations into towns and cities. Urbanization has played an important role in the developed and developing countries. It is belived that the developed countries of the world could achieve fast economic progress due to large scale urbanization.

Maharashtra State has seven Divisions – Amravati, Aurangabad, Kokan, Mumbai, Nagpur, Nashik, and Pune. The Nashik Division has five Districts – Nashik, Jalgaon, Nandurbar, Ahmednagar and Dhule. The Nashik city is the headquarters of both the Nashik district and Nashik division. The Nashik city is situated in the State of Maharashtra, in the northwest of Maharashtra; on Latitude coordinate 19° 58' 59" North to 20° 04' 30" North Latitude and Longitude coordinate 73° 41' 30" East to 73° 52' 0" East longitude. It is connected by road to Pune (220km) and Mumbai (185km). The city is contour line of below 2000ft and the basin is at 1960ft M.S.L. Rail connectivity is through the central railway, connected with Mumbai. Air connection is with Mumbai but the air service is not consistent and a proper airport does not exist. This geographical location, the city naturally started growing westward between the two main rivers, the Godavari and the Nasardi, towards Anandvalli, Gangapur and Satpur area. The Climate of Nashik City is favorable and Healthy for good urbanization. The annual temperature ranges between 15^0C Min. and 34^0C Max. The average rainfall in Nashik City is observed 53 mm. the average humidity is observed in the study area ranges between 34 % and 92 %.

Nashik City is popularly known as the "Grape City" and for its twelve yearly 'Sinhasta Kumbh Mela'. Nashik has a personality of its own due to its historical, social and cultural importance. Geographical proximity to Mumbai (Economic capital of India) and forming the golden triangle with Mumbai and Pune has accelerated its growth.

In 1881 old Nashik was occupying 13 sq.km area. Then in 1931 it was expanded up to 20 sq. km and population increased rapidly day by day. In 1951 it was expanded up to 47 sq. km area. Nashik Municipal Corporation was formed on November 7, 1982 as a body corporate under the Bombay Provisional Municipal Corporation (BPMC) Act, 1949. NMC serves area approximately 259.10 sq. km, including the city and its peripheral areas. It is one of the oldest cities in India.

The researcher has more interest to know the pattern of its study area. The Land use pattern shall vary as per increase in population in study area. The land use pattern of Nashik city has been divided into two i.e. developed area and undeveloped area. The undeveloped areas contain 32.74 per cent area of the city. In the developed region the residential area occupies 31.86 per cent of the study area. The public and semi-public, transport and communication both account for 1.58 per cent and 10.80 per cent respectively. The commercial, Industrial, Garden and recreation occupy less area i.e. 13.94 per cent of the total area. The military occupied 943.70 hectares, CIDCO 398 hectares, and the area of water bodies 655 hectares i.e. 2.52 percent of total area. It is also observed that Undeveloped area contain 69.13 percent in the year 1985 as it reduced by 44.41 percent in the year 2014 out of the total study area, i.e. 24.95 percent of study area converts into Developed area from Non- developed area in last 3 decades.

The Nashik city is growing faster. Every day a new industry is established or devloped in the city due to establishment of Railway Station in the year 1861, industrial estates in the year 1962, India security Press in the year 1924, Currency note Press during year 1928. The phenomenal growth during the decade 1941-51 could be mainly attributed to the Government policy of rehabilitation of refuges

Nashik has good transportation network like the national highway No.3 i.e. Mumbai - Agra road connects Nashik to Mumbai and Dhule, National highway No.50 connects Nashik to Pune. Nashik also has good railway connectivity as it is situated on the main line of central railway on Mumbai-Bhusawal section. In addition to this four state highways i.e. Nashik- Aurangabad (SH-60), Nashik-Trimbak (SH-4), Nashik-Dindori-Wani (SH-11) and Nashik Peth (SH-12), also provide additional connectivity termer, these two state highways also connect Nashik to Gujarat state. One Major river i.e. Godavari flows through the city and its three tributaries i.e. Darana, Nasardi and Waldevi also flow through study region.

Nashik Municipal Corporation is spread over area of 259.10 sq.km. Such a large area in broadly divided into six distinct division geographically. Each of the division has their arterial roads and their link roads with other division. Besides these roads, inner and outer ring roads as per the sanctioned development plan of Nashik (sanctioned in 1993) are being developed by Nashik Municipal Corporation. Thus existing road network of Nashik city is based on all these roads.

In the study region, As per Nashik city R.T.O. office record total vehicle register up to 2013 years is 10,52,901 Nos. and total vehicle registered up to 2014 year is 11,54,243 Nos. Two wheeler vehicles share about 73.6 per cent of the total vehicle out of which nearly 56.50 per cent are motor cycles. Motor cycle and scooter these two maintains same percentage growth in last two years. It means that the private transportation system has been used in the study region.

The division-wise distribution of rickshaw stops in the city is uneven. Number of rickshaw stops varies from 20 to 56. In Nashik road division Bytco *chowk* and its surrounding area have more capacity of rickshaws per stop. The Nashik East, Nashik Road and Satpur division have more number of stops i.e.56, 45 and 44 respectively. These three divisions are cover Nashik road railway station and C.B.S. so having high frequency of transit people. The number of rickshaws at rickshaw stop varies from division to division. The Nashik Road division, which includes Nashik road railway station, has the highest number of rickshaws 466 (21.38 percent of the total). The Nashik West division ranks seconds, which has 17.80 per cent of rickshaws because this division includes the area of Central Bus Stand of the city.

The number of rickshaws and their trips have been considered and tabulated. It has observed that, the highest frequency of rickshaws has been found at C.B.S (2350) followed by Nimani bus stand (1750) and Nashik road railway station (1470). They account 25.30, 18.84, and 15.82 percent frequency of rickshaws respectively. These three divisions/nodes are very important. The Nashik West division is located on the western part of C.B.S, New Nashik division is located in the southern part and Satpur division is located in south-west of the study region, where rickshaw stops are located on the main roads of C.B.S, railways stations, Zillah Parishad, Collector's Office, District Court and M.I.D.C area.

The frequency of buses is an important aspect of the study in intra urban transport system because the city bus links the neighborhood area and suburban areas which is newly developed. The movement of passengers through the bus has got more importance in traffic system. It has observed that, the highest frequency of Buses 155 per day is found from Nimani to Nashik Road, the second highest frequency is observed from Nimani to Kamthawade i.e. 82 Buses per day. The Deolali Camp and Ambad M.I.D.C. have same frequency of Buses i.e. 61 Buses each. The deolali gaon, Vihit gaon, Satpur gaon have same frequency of 58 Buses per day for each. the highest frequency of Buses per day (150 or 23.36%) is observed

from Nashik Road Bus stand to Nimani Bus stand because this route covers Central bus stand of Nashik City. Most of the people travel to the main area of the city for their business relations.

Analysis the structure of the transportation network has became important in the study of transport geography. "Formerly transport network tended to develop in a somewhat random and often unrelated fashion but post-war changes and developments in transport focused attention upon the analytical study of networks various measures relating to the number of vertices and edges have been developed to measure the properties such as the connectivity, sheep and complexity of networks. These measures provide bases for empirical comparison of different networks and other variables. "These indices are related to regional characteristics such as economic development, size or shape.

Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 3 for Panchavati division. Higher the Alpha index shows greater degree of connectivity within the network but for Panchavati division it has observed only 13% which show low degree of connectivity. For the study division the Beta index is 1.14; it means that the Panchavati division has high connected by road network. Gamma index describes connectivity of networks in percent which has observed 44.44% which show quite well connectivity. If value of pi index is more than 2 then given road network is well connected, for Panchavati division it has observed 3.24, which shows high connectivity but E.T.A. index observed 2.22 km / Nos., which has shown high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers, the route Makhamlabad Naka to R.T.O has less detour index i.e. 148.00 so it has less effect of relief barrier but the route Meri-Mhasrul to Hirawadi has more detour index i.e.278.33 so it has more effect of relief barriers. The Shimbel index can be derived from the shortest-path matrix in the study division. The Nimani bus stand has lowest Shimbel index, and the associated number is 3, so it is most accessible node than the other nodes. The highest associated number 5 has observed for Amrutdham and Ramkund where accessibility has found low. For the Panchavati division the mean associated number is 54/14=3.85.

Cyclomatic numbers, which tell about present of fundamental circuit of a given transportation, network which has observed 8 for New Nashik division. Higher

the Alpha index shows greater degree of connectivity within the network but New Nashik division it has observed only 32%, which show low degree of connectivity. For the study division the Beta index is 1.47; it means that the New Nashik division has highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 56.41 % which show quite well connectivity. If value of pi index more than 2 then given road network is well connected, for New Nashik division it has observed 4.01 which show high connectivity, also E.T.A. index observed 1.51 km / Nos. which has shown high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers. The route Uttam Nagar to Shivaji *Chowk* has less detour index i.e. 115.79 so it has less effect of relief barrier but the route Vadner to Ranapratap *chowk* has more detour index i.e.208.69 so it has more effect of relief barriers. The Shimbel index can be derived from the shortest-path matrix in the study region. The Pathardi Phata has lowest Shimbel index, and the associated number is 3, so it is most accessible node than the other nodes. The highest associated number 6 has observed for Trimurti *chowk*, Pimpalgaon Khamb where accessibility has found low. For the New Nashik division the mean associated number is 65/15=4.33.

Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 10 for Nashik West division. Higher the Alpha index shows greater degree of connectivity within the network but Nashik West division it has observed 66.66% which show quite well degree of connectivity. For the study division the Beta index is 1.8; it means that the Nashik West division has highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 75% which is high connectivity. If value of pi index more than 2 then given road network is well connected, and for Nashik West division it has observed 3.25 which shows high connectivity. E.T.A. index observed 1.13km / Nos. which has show high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers. The route Sambhaji *Chowk* to Mumbai Naka has less detour index i.e. 114.28, so it has less effect of relief barrier but the route C.B.S to K.T.H.M College has more detour index i.e.200.00 and it has more effect of relief barriers. The Shimbel index can be derived from the shortest-path matrix in the study region. The College road has lowest Shimbel index, and the associated number is 2, so it is most

accessible node than the other nodes. The highest associated number 4 has observed for Savarkar Nagar, Mumbai Naka where accessibility has found low. For the Nashik west division the mean associated number is 29/10=2.9.

Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 6 for Satpur division. Higher the Alpha index shows greater degree of connectivity within the network but for Satpur division it has observed only 46.15 % which show quite well degree of connectivity. For the study division the Beta index is 1.44; it means that the Satpur division is highly connected by road network. Gamma index describes connectivity of networks in percent which is observed 61.90% which is quite well connectivity. If the value of pi index is more than 2 then given road network is well connected. For Satpur division, it is observed 3.45, which shows high connectivity. E.T.A. index observed 2.04 km/ Nos., which has shown high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers. The route Satpur to Shivaji Nagar has less detour index i.e. 128.12 so it has less effect of relief barrier but the route Pimpalgaon Bahula to XLO has more detour index i.e. 236.64 so it has more effect of relief barriers. The Shimbel index can be derived from the shortest-path matrix in the study division. The Satpur has lowest Shimbel index and the associated number is 2, so it is most accessible node than the other nodes. The highest associated number 3 has observed for ABB Circle, I.T.I. Signal, Pimpalgaon Bahula, Ashok Nagar, Shivaji Nagar, Gangapur, and X.L.O. where accessibility has found low. For the Satpur division the mean associated number is 25/9=2.77.

Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 8 for Nashik road division. Higher the Alpha index shows high degree of connectivity within the network but for Nashik road division it has observed 53.33% which show quite well degree of connectivity. For the study division the Beta index is 1.5; it means that the Nashik road division is highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 62.50% which has shown quite well connectivity. If value of pi index more than 2 then given road network is well connected, for Nashik road division it has observed 3.83 which show high connectivity, E.T.A. index observed 2.55 km / Nos. which has high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have

affected by relief barriers, the route Vihitgaon to Chehedi has less detour index i.e. 114.81 so it has less effect of relief barrier but the route Samangaon to Eklahara P.S has more detour index i.e. 325.00 so it has more effect of relief barriers. The shimbel index can be derived from the shortest-path matrix in the study region. The Bytco *chowk* has lowest Shimbel index and the associated number is 2, so it is most accessible node than the other nodes. The highest associated number 3 has observed for Eklahara power station, Jail road, Upnagar, Vihitgaon and Samangaon where accessibility has found low. For the Nashik road division the mean associated number is 25/10=2.5.

Cyclomatic numbers, which tell about present fundamental circuit of a given transportation, network which has observed 7 for Nashik East division. Higher the Alpha index shows high degree of connectivity within the network but for Nashik East division it has observed 41.18% which show quite well degree of connectivity. For the study division the Beta index is 1.54; it means that the Nashik East division is highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 62.96% which has shown quite well connectivity. If value of pi index more than 2 then given road network is well connected, for Nashik East division it has observed 5.24 which show high connectivity, E.T.A. index observed 1.66 km / Nos. which has high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers, the route Mumbai naka to Indira Nagar has less detour index i.e. 155.00 so it has less effect of relief barrier but the route Takali Phata to Bhadrakali has more detour index i.e. 165.38 so it has more effect of relief barriers. The shimbel index can be derived from the shortest-path matrix in the study region. The Dwarka has lowest Shimbel index and the associated number is 2, so it is most accessible node than the other nodes. The highest associated number 4 has observed for Ashok Stambh, R.K, Bhadrakali, Takali Phata, Agar takali, Wadala where accessibility has found low. For the Nashik east division the mean associated number is 37/11=3.36.

Cyclomatic numbers, which tell about present of fundamental circuit of a given transportation, network which has observed 6 for All Combine division. Higher the Alpha index shows greater degree of connectivity within the network but for All Combine division it has observed 85.71% which show high degree of connectivity. For the study division the Beta index is 1.83; it means that the All

Combine division is highly connected by road network. Gamma index describes connectivity of networks in percent which has observed 91.66% which show high connectivity. If value of pi index more than 2 then given road network is well connected, All Combine division it is observed 4.98 which show high connectivity, E.T.A. index observed 4.98 km / Nos. which has shown high connectivity for study division. It has observed that the detour has found more than 100.00, it means that these places have affected by relief barriers, the route College road to Bytco *chowk* has less detour index i.e. 128.29 so it has less effect of relief barrier but the route College road to Pathardi Phata has more detour index i.e. 195.89 so it has more effect of relief barriers. The shimbel index can be derived from the shortest-path matrix in the all combine division. The Dwarka has lowest Shimbel index and the associated number is 1, so it is most accessible node than the other nodes. The highest associated number 2 has observed for Nimani bus stand, Bytco *chowk*, Pathardi Phata, Satpur, College road where accessibility has found low. For the all combine division the mean associated number is 11/6=1.83.

Central business district is a part of city, unique in its land use and distinctive function, and is thus different from all other parts of the city. The term C.B.D. originally an American term that indicates the heart of the city. For find out C.B.D. of study region, I has studied it with different aspect which results are furnished as ahead.

The Assessed land values meant the actual value/price estimated by competent private Assessors. In the Study region, the Assessed land values are ranging from Rs. 1300 to 63100 per sq. These Assessed land values are varies according to location of market. The highest Assessed land value has found near college road (Rs 63100 per sq.) These areas have highest market value because they are located near old core area of study region. The low Assessed land values are found in Vadner, Pimpalgaon Khamb because these areas are located in the peripheral parts of Study region.

The market land values meant the actual value/price of the land at the time of sale. In the Study region, the market land values are ranging from Rs. 1500 to 100000 per sq.m. These market land values are varies according to location of market. The highest market land value has found near college road (Rs 100000 per sq.m) These areas have highest market land value because they are located in new commercial hub as well as part of Town Planning scheme-2 so having proper

planning and have high end amenities. The low market land values are found in Chadegaon, Ager Takali, Pathardi, Wadala, Chehedi because these areas are located in the peripheral parts of Study region.

In the Study region, on the basis these assessed rent values of various 103 market areas or paths out of 6 divisions have been taken into consideration. The rent value is the highest for residential more than Rs. 2500 per 100 sq. feet per month beside of college road area because it is a new CBD which has been developed recently and the rent value is the highest for commercial more than Rs. 3000 per 100 sq. feet per month near Ambad and Satpur M.I.D.C and also have same highest industrial rent values more than Rs. 5000 per 100 sq. feet per month. C.B.S, Gangapur road, and the nearby college road have higher rent values Above Rs. 2000 per 100 sq. Feet per month because it is a new CBD which has been developed recently. The peripheral area of city has less rent values i.e. 100 sq. feet per month. The division and the areas along with the main street have higher rent values. Rent values in the Study region decrease from central part to outward areas. This effect is only due to influence of C.B.D. The Land, Market and Rent cost has been increased within C.B.D.

In the Study region, the division wise analysis has been done to find out concentrations of S.T.D. Booth, Coin-boxes, Fax Centers, Mobile shops, Computer Training Centre, Internet café, Xerox Centre, Bus stand, Rickshaws stop, Banks and Insurance Offices. It has observed that concentration of S.T.D./ Local Telephone Booth Centers highest in Panchavati Division and Lowest in Nashik West Division, Coin-Boxes Centers highest in Nashik East Division and Lowest in Satpur Division, Fax Centers highest in Panchavati Division and Lowest in Nashik West Division, Mobile Shopping Centers highest in New Nashik Division and Lowest in Nashik West Division, Computer Training Centers, Internet Cafe and Xerox Centre are highest in Nashik West Division and Lowest in New Nashik Division, Bus stands highest in Nashik Road Division and Lowest in Nashik West Division, Rickshaws stop highest in Nashik East Division and Lowest in Satpur Division, National Banks highest in Nashik West Division and Lowest in Nashik East Division, Co-operative Banks highest in Nashik East Division and Lowest in Nashik West Division, Path Sanstha Or Pedhies highest in Nashik East Division and Lowest in Nashik West Division, General Insurance offices and Life Insurance offices highest in Nashik West Division and Lowest in New Nashik Division.

In the study area total 629 numbers of Hospitals has observed out of which highest observed in Panchavati Division i.e. 180 Numbers and Lowest observed in Nashik East Division i.e. 65 Numbers. In the study area total 4523 numbers of Dispensaries has observed out of which highest observed in New Nashik Division i.e. 1050 Numbers and Lowest observed in Nashik West Division i.e. 435 Numbers.

In the study area total 5506 numbers of Doctors has observed out of which highest observed in Panchavati Division i.e. 1235 Numbers and Lowest observed in Nashik West Division i.e. 630 Numbers. According to Division wise total population and availability of total numbers of Doctors in that Division i.e. Ratio of Doctors to its Division Population Nashik East Division have Lowest Ratio i.e. 1 Doctor after 342 person and Highest Ratio observed in Panchavati Division i.e.1 Doctor after 233 person. According to total Population of study area i.e. 14, 86,053 there are total 5506 numbers of Doctors. The ratio has been observed one doctor after 270 people, which is very good as compared to ratio within India i.e. 1 doctor per 1681 person and as per WHO 1 doctor per 1000 person.

In the study area total 351 Primary Schools and 2,95,916 Students has observed out of which highest Primary Schools observed in New Nashik Division i.e. 75 Numbers and Lowest Primary Schools observed in Nashik East and Satpur Division i.e. 40 Numbers. In the study area total 254 High Schools and 1,78,901 Students has observed out of which highest High Schools observed in Nashik West Division i.e. 54 Numbers and Lowest High Schools observed in Satpur Division i.e. 34 Numbers.

In the study area total 16 Engineering Colleges and 15,050 Students has observed out of which highest Engineering College observed in Nashik West and Panchavati Divisions with 5200 and 5350 Students respectively. In the study area total 18 Medical Colleges and 9,020 Students has observed out of which highest Medical Colleges observed in Panchavati Division i.e. 11 Numbers and Lowest Medical Colleges observed in Nashik Road Division i.e. 1 Numbers.

According to Division wise Total Education Faculties to the Total Education Faculties in study area Nashik West and New Nashik Divisions has highest percentage of total Education Faculties i.e. 19.72% and 19.10% respectively. And lowest percentage has observed in Nashik East and Satpur Divisions i.e. 12.20%.

According to all observations, the Nashik road railway station in Nashik road division and C.B.S in Nashik west division with its surrounding area got more

importance because of more concentration of administrative offices and commercial activities. The Nashik road railway station in Nashik road division and College road in Nashik west division is the CBD of the Nashik city. In this division District Court, Collector office, N.M.C office, Most Educational Institute are situated due to which concentration of people for related business has been observe and so it has become C.B.D. of study region.

Nashik was seventh largest city in 1947 of Maharashtra and it is the 4th largest Industrial city. Nashik has achieved this starting from 1945 to year 2011. It has observed that the population of Nashik city has been continuously increasing from 1901 to 2011. In 2011 Nashik has become a million plus city. The growth of the population in Nashik city is considered from the decade 1901 to 2011. It has increased from 21,490 persons in 1901 to 14, 86,053 persons in 2011, i.e. more than fifty fold increase.

There are different measures to determine the growth of urban population. The absolute growth of urban population shows the amount of net increasing in a particular period. It throws light on the magnitude of problems arising out of the extra number of the people in the city, for whom urban amenities will be provided. The annual change in population has found higher in the decade 1991, which has sharply decreased in the decade 2001.It has observed that the lowest annual change in population has found in the decade 1941 (i.e. 1.35 per cent) and second lowest in 1931 (i.e. 1.79 per cent). In the study region the highest growth rate found in the decade 1991 because of the growth of urban areas which is expanding into various colonies and immigration from rural areas to urban areas for the purpose of employment.

In the year 2011 population was recorded 14, 86,053 and 37.95 per cent decadal growth rate. The absolute increase in this decadal observed to 17, 66,469 persons. Arithmetical increase method increase in the population in these decades is predominant and it can be seen that average increase in the population shows the trend of fast development. It has due to number of reasons like Nearness to Mumbai and Pune, very good climate in all season, Holy place and Pilgrimage center, Good infrastructure, Good connectivity through road and rail, Atmosphere of industrialization, Good education center. Good cultural activities, commissioner and District head quarter, Agricultural produce market.

It has observed that the density of population has increased from 1951 to 2011. In 1951, the density was 1,665 people /sq.km, which has increased up to 4,158 people /sq.km in 2001. It has due to increase in the area of Nashik city from 58.28 sq.km to 259.10 sq. km. It has been found that density of population increased again in 2011 up to 5,736 people/ sq.km. In each decade, there is a gradual increase of population growth rate in Nashik city. The urban population increased because of migration from rural areas.

As compared to population growth rate of 1991-2001 decade to 2001-2011 decade it has observed that population growth rate of Nashik East division has increased sharply (i.e. from 02.28 per cent, 69.60 per cent). The density of population has found highest in Nashik East division and Nashik West division which are nearly double as compared to sum of density of Panchavati division, Nashik Road division, New Nashik division and Satpur division in 1991 and 2011decade because Nashik East division and Nashik West division having the old core area of the Nashik city.

According to 2011 census the Nashik city has 52.66 per cent males and 47.34 per cent females. A comparative analysis of division wise distribution of population indicates that the per cent of male population is highest in Satpur division (i.e. 53.91 per cent) and lowest in Nashik West division (i.e. 51.57 per cent). The Per cent of females population is highest in the Nashik West division (i.e. 48.43per cent) and lowest in the Satpur division (i.e. 46.08per cent) of the study area.

A high level of literacy reflects the dynamic character of city population. The total literacy population of Nashik city was 67.10 per cent in 1981, which increased up to 77.10 per cent in 2011. According to 2001 census, the Nashik West division has highest total literacy rate of 79.50 per cent while lowest literacy rate has noted in Panchavati division i.e. 71.20 per cent. The highest male literaty rate of 82.87 per cent has found in Nashik West division and lowest male literacy rate 78.40 per cent has observed in Satpur division. It has also observed that Nashik West division has found highest female literacy ratio and Panchavati division has noted lowest-female literacy rate i.e.75.89 per cent and 63.79 per cent respectively. According to 2011 census, the Nashik West division has highest total literacy rate i.e. 82.30 per cent while lowest literacy rate has noted in Nashik Road division i.e. 70.80 per cent. The highest male literate rate of 89.90 per cent has found in Satpur division and lowest male literacy rate 79.50 per cent has observed in Panchavati division. It has also observed that Nashik West division has found highest female literacy ratio and

Panchavati division has noted lowest-female literacy rate i.e.81.25 per cent and 70.61 per cent respectively. The general increase in literacy ratio especially female literacy because of the increased provisions of educational amenities in the city, safe atmosphere for woman learning, starting of number of primary, secondary and higher education institutions out of which Some are exclusively for women during the last three decades.

It has observed that the sex ratio was very low in study region because of migration of male working population from rural to urban area. This yield of sex ratio in decade of 1971 was 898 and slightly increases up to 899 in the decade 2011. Occupational structure is perhaps the most important social characteristics influencing man's life. The labour participation ratio for total workers is defined as the percentage of total workers to total population. For Nashik city the labour participation ratio was 28.37 per cent in 1981 and it has increased up to 48.00 per cent in 2011.

It has been observed that percentage of male working population has decreased up to 66.56 per cent while the female working population has found increased up to 33.44 per cent in 2011. The percentage of workers in 1981 was 30.18 per cent which was increased up to 38.45 per cent in 2011 because of various industrial units has been established in Nashik city. It has been seen that the percentage of tertiary sector has decrease because percentage of marginal workers in this sector has increased.

It shows that the result of different method of the population projection is not same. For every day city planning anticipation of future population is mean necessary. In decade 2001, out of total numbers of population i.e. 10,77,236, total number of workers in all categories including marginal workers are 3,71,423 persons out of which 3,02,851 are males and 68,572 are females. The majority of the workers are engaged in secondary and tertiary activities. The total percentage of workers in these two sectors during 2001 was 78.41 per cent. This indicates the urban character of the study area.

Occupational structure of the Nashik city in the year 2011is that the total number of workers in all categories including marginal workers are 7, 13, 305 i.e. 48.00 per cent of total population of 14, 86,053, out of which 4, 74,811 persons are males and 2, 38,494 are females. It has been observed that the male and female workers participation in which women participation is very less but it increasing

gradually. The labour participation ratio works out of 48.00 per cent as per 2011 census which is considerable good and indicates the urban character of the study area.

5.1 CONCLUSION

It is belived that the developed countries of the word could achive fast economic progress due to large scale urbanization.The city of Nashik is the headquarters of both the Nashik district and Nashik division. The Climate of Nashik City is favorable and Healthy for good urbanization. The annual temperature ranges between 15^0C Min. and 34^0C Max. The average rainfall in Nashik City is observed 53 mm. The average humidity observed in the study area ranges from 34 % to 92 %. So this figure gives clear idea about Healthy atmosphere in Nashik city.

Nashik City is popularly known as the "Grape City" and for its twelve yearly 'Sinhasta Kumbh Mela'. Nashik has a personality of its own due to its historical, social and cultural importance. Geographical proximity to Mumbai (Economic capital of India) and forming the golden triangle with Mumbai and Pune has accelerated its growth.

Nashik city itself and its population day by day increased rapidly. In last 6 decades, its area has been increased from 20 sq.km to 259.10 Sq.km. It increased 10 times than its original area.

The land use pattern of Nashik city has been divided into two i.e. developed area and undeveloped area. In last 3 decades 24.95 percent of study area converts into Non- developed area to Developed area.

Establishment of industry is cause which leads the urbanization in nashik city. Nashik was seventh largest city in 1947 of Maharashtra and it is the 4th largest Industrial city. Nashik has achieved this starting from 1945 to year 2000. The population of Nashik city has been continuously increasing from 1901 to 2011. In 2011 Nashik has become a million plus city. In the study region the highest growth rate found in the decade 1991 because of the growth of urban areas which is expanding into various colonies and immigration from rural areas to urban areas for the purpose of employment. Transportation structure established and developed properly to lead urbanization in Nashik city. This developed transportation structure consequence on public that they have used own transportation facility. Only the visiting people used private and government transportation amenities like rickshaw

and bus. After saw a frequency of rickshaw and buses, we have an idea of visiting people in Nashik city for their related business. This frequency has been observed more near Nashik road railway station and Central Bus Stand.

The transportation system analysis within study division of study area shows better degree of connectivity within study area. This is also a considerable cause to lead urbanization. However, at the same time, this has also consequence like increased population, population density; increases land cost, setup of commercial hub. This phenomenon of cause and consequence of urbanization has been seen in study area after the analysis of transportation system.

If people have the required social amenities like Road, Hospital, School, Water, Electricity then this amenities tends to urbanization and this one cause to set up Central Business Districts (C.B.D.).The setup of C.B.D. also consequence like leading land cost, market cost, rent cost, commercial hub establishment. This phenomenon was clearly seen C.B.D. area of Nashik West division, Nashik Road Division and some parts of CIDCO division. In other words it also has positive consequences that people got business, employment within C.B.D. area with business like Xerox center, S.T.D. Booth, Mobile shops, Computer center etc.

In the study region availability of health amenities is very good. According to WHO 1 doctor needed per 1000 person but in study area it has been observed 1 doctor per 270 people, so it cause for urbanization. This has also results some consequence like population growth, density of population, cheaply availability of medical services, and unsafetyness of people.

Various social amenities like Hospital, Education, and Garden etc. also cause for urbanization. Generally, the people attract towards these things and set up lives over there. As above we saw development of Hospital amenities in study area. Now education amenities have also seen well developed in study area. Development in education amenities effects on population of study areas. This leads to improve population in study area. This also provides bulk workers within study areas. Education sector provide lot of employment within study area.

Nashik road railway station in Nashik road division and C.B.S in Nashik west division with its surrounding area got more importance because of more concentration of administrative offices and commercial activities. The Nashik road railway station in Nashik road division and C.B.S in Nashik west division area is the CBD of the Nashik city. In this division District Court, Collector office, N.M.C

office, Most Educational Institute are situated due to which concentration of people for business are observe and it's so became C.B.D. of study region.

It has been seen that average increase in the population shows the trend of fast development. It may be due to number of reasons like Nearness to Mumbai and Pune, very good climate in all season, Holy place and Pilgrimage center, Good infrastructure, Good connectivity through road and rail, Atmosphere of industrialization, Good education center, Good cultural activities, commissioner and District head quarter, Agricultural produce market.

Increase of population is said to be a cause of urbanization as well as consequence of urbanization. In all decades there is a gradual increasing of population growth rate in Nashik city and Nashik district in urban population because of migration from rural areas.

This cause may reflect consequence like population increases, density of population increases. It hit directly to the service provider authority to provide urban need services. If service provider authority would have short fall of income to provide a services then they would increase taxes like house tax, water tax etc. This would also increase land cost and other related cost within the study area. This phenomenon has seen in study area.

Good education amenities in study area cause to set up good literacy structure but this has been also consequences in terms of economy, Female strength, and Technical development within study areas. However the general increase in literacy ratio especially female literacy because of the increased provisions of educational amenities in the city, safe atmosphere for woman learning, starting of number of primary, secondary and higher education institutions out of which Some are exclusively for women during the last three decades.

The sex-ratio was very low in study region, because of migration of male working population from rural to urban area. This yield of sex ratio in decade of 1971 was 898 and slightly increases up to 899 in the decade 2011.

A developed occupational structure is also the cause of urbanization. This is most important social characteristics influence on man's life. Total working population increased day by day in the study area which showing a good urban character of city. Especially female working population increased rapidly due to various industrial units has been established in the Nashik city. This developed occupation structure consequence in the form of economy and social infrastructure

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within the study area. The majority of the workers have been seen in secondary and territory activities nearly about 76 percent of total working population. The labour partition ratio is observed 48 percent in which comparative female working participation is less but increasing gradually. It is the good sign of urban character of the study area.

5.2 SUGGESTIONS:

Any program for the development of a town has to take into consideration its socio-economic as well as physical factors within its broad framework. All these factors put together in the most desirable combination in an urban set up would yield the necessary environment for a pleasant human habitation. In the Indian context, life in town, right from smaller towns to metropolitan cities has been described as one of "Chaos" or of "despair". One of the major causes for such a state of affair seems to be lack of proper understanding and co-ordination among physical, social and economic planners in charge of urban planning. The purpose of this brief note is to present a diagnostic view of the development of Nashik city which is one of the several hundreds of towns/cities sharing all the ills of the urbanization.

- Land use should be adopted as per sanctioned development plan.
- Efforts should be made to reduce temperature within the city by Plantation of trees and by introducing green building concept.
- Strom water drainage should be established in the low lying area of the city.
- Basic urban amenities should be established within peripheral area of the city to generate affordable houses, to lowering population density, Land cost, Market cost and Rent Value within specific area of city.
- Lower budget educational facility should be provided for poor people to achieve better literacy rate.
- Awareness camp should be taken for improvement of sex ratio within the Nashik city.
- Government transportation amenities should be improved to lowering vehicle density of citizen's vehicle.
- Proper planning should be done for routes, Trips, Stops of Rickshaws and Buses to avoid traffic congestion.
- All ring roads should be developed as per Sanctioned Development Plan of Nashik city.

- All commercial or business premises should have more parking than as per requirement mostly at the back side of the project area.

- The most traffic congestion point like C.B.S, R.K, Collector office, District Court should be reduced by constructing fly over in this area and constructing multi-story parking within the premises.

- Hawker's zone should be specified within city.

I hope that the findings of this Research verify the objectives of "Causes and Consequences of changing urbanization patterns in Nashik Municipal Corporation, Maharashtra".

- Analysis and findings of present study should be help to provide valuable information for further studies, planning and application.

- Making a plan is not important but implementation of that plan is most important.

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