

**AMBIENT NOISE MONITORING AND ZONING OF LOVELY
PROFESSIONAL UNIVERSITY CAMPUS**

Dissertation Report

**Submitted in Partial fulfilment of the
Requirements for the award of the degree of**

MASTER OF TECHNOLOGY

in

CIVIL ENGINEERING

by

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Transforming Education Transforming India

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DECLARATION

I, Humaib Nasir (11407873) student of Lovely Professional University (school of civil engineering) hereby declare that the report on “ **Ambient Noise Monitoring and Zoning Of Lovely Professional University Campus**” submitted in the partial fulfilment of the requirements for the award of degree of Master of Civil Engineering, in the School of Civil Engineering, Lovely Professional University, Phagwara, is my own work. This matter embodied in this report has not been submitted in part or full to any other university or institute for the award of any degree.

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CERTIFICATE

Certified that this project report entitled “ **Noise Monitoring, Zoning and Mapping Of Lovely Professional University Campus**” submitted individually by **Humaib Nasir** ,student of School of Civil Engineering, Lovely Professional University, Phagwara , carried out the work under my supervision for the Award of Degree. This report has not been submitted to any other university or institution for the award of any degree.

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ABSTRACT

Noise pollution is one of the foremost and grave public health and environmental anxiety in most of evolving countries. No doubt in today's era major concern is shown towards environment only but still there are certain places around which pollution is not considered to be a serious issue but in real conditions it cannot be neglected for example for district Phagwara having multiple industries along with busy roads that cater lot of moving vehicles thus raising an issue of noise pollution around various places of that district. LPU campus is one such place where extensive noise quality monitoring can be done. The objective of this study to provide insight details about current situation of noise levels across lovely professional university campus, along with countless origins and effects of noise pollution. An attempt is made to study nature of noise that all the human beings and other organisms feel inside campus highlighting the noise levels at various places in campus. Noise control or Noise zoning is an arrangement of methodologies to lessen sound contamination or to decrease the effect of that sound, whether outside or inside. The primary zones of noise relief or reduction are: transportation commotion control, engineering outline, urban arranging through zoning codes, and word related sound control. Noise zoning is a technique by which an entire area can be divided into various zones on the bases of the amount of noise in decibels that is produced in that area. These zones clearly indicate the most severe zone and less severe zones in order to take various steps to overcome the alarming effects of that noise. Comparative study of noise quality inside campus will be done by determining Noise levels during peak hours i.e. morning at 9 am, then at 1 pm and at evening time i.e. at 4 to 5 PM, as at these time slots large number of students are mostly found outside of their classrooms as their lectures were over and during lunch breaks. These time slots have been chosen so because this is the only time when lot of noise is produced in each and every block. In this study sound level meter was used to determine the amount of noise created in each blocks at different monitoring locations at which noise levels will be determined. The main focus of this thesis is to provide comprehensive review of noise monitoring practices in India considering LPU campus as monitoring station with objectives: to identify critical problem areas suffering from severe noise pollution by an objective assessment of state of practice and to recommend suitable measures for improvement where ever applicable.

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CHAPTER 1

INTRODUCTION

1.1 It's a noisy world. Twenty-four hours a day, seven days a week, we are exposed to sounds we do not want, need or benefit from. There are few places on the planet where in our daily lives we are free from unwanted sounds. Noise from many outdoor sources assails our hearing as it invades our homes and workplaces: traffic, aircraft, barking dogs, neighbors' voices. Noise within the workplace — from office machines, telephones, ventilating systems, unwanted conversation in the next cubicle —distracts us from our work and makes us less productive. Noise from within the home — from appliances, upstairs footsteps, TV sound traveling from room to room, keeps our homes from being the restful refuges they ought to be. Noise in the classroom impedes the learning process and threatens our children's educational experience. It is very unfortunate that we people come across various forms of loud noise during the day time .It has become like daily dilemma to bear this unnecessary havoc created by blowing of horns on roads, madness created by loudspeakers, festive time expression of madness, any processions being carried on streets, along with it is the background scores of Indian melodramatic serials creating mess in almost every household and other innumerable sources than an individual can't even think of .Majorly nowadays people have perception about happiness they think can be expressed by creating loud noises only. Even a child birth nowadays in rural areas is informed by crackling sounds created by tapping utensils in rural areas.

1.1.1 Background of study: "Noise" means any sound which exceeds the appropriate actual or presumed ambient noise level or which annoys or tends to disturb humans or which causes or tends to cause an adverse psychological or physiological effect on humans. "Noise zone" means defined areas of generally consistent land use where the ambient noise levels are generally similar within a range of decibel.Noise is being recognized as serious environmental problem and one which must be addressed for sustained development policy which is designed to improve the quality of life of citizens Noise pollution is considered as one of the major environmental concerns today also it's very sad to say that most of people are unaware about the effects that it can cause. Noise pollution in India has become one of the major issues leading to occurrence of hearing loss or impairedness, increased stress levels, behavioral and mental problems, insomnia, heart ailments and many more. Once safe levels are crossed noise becomes serious health hazard unfortunately these levels are not taken into consideration in India. It has

been already proven that cities with medium as well as larger commercial zones as compared to other cities have higher implications of noise pollution. Study was conducted by international research journal of environmental science on levels of noise pollution of various zones like industrial zone ,commercial zone, silence zone and residential zones of Morena districts of Madhya Pradesh and it was perceived that too much honking of horn was the major cause of noise pollution in the area .Addition to it encroachments and poor conditions of roads added the overall mess as they led to occurrence of traffic jams .This condition is just an idea about one district now we can easily figure out condition of other bigger districts and cities around India where commercial zones are wider in addition to numerous vehicles on roads apart from numerous encroachments . So it becomes inevitable to figure it out so that timely action can be easily taken with regard to situation .Major studies have been conducted related to noise monitoring in many parts of country. Mostly in major parts of survey it has been found that major cause of pollution are vehicles along with assembly of personal in groups for conversations .In Balasore it was found that noise created by traffic was way more than permissible range 70 dba .On further research it was found that all individual vehicles created noise more than their permissible limits.

An extensive research was conducted by central pollution control board to measure noise pollution in four different zones which revealed that during day time highest noise levels were recorded at silent zones i.e. educational institutions, religious places, hospitals on the other hand lowest was found in residential areas .During night, highest pollution levels were found at intersecting areas and lowest was in industrial areas. Another study was conducted during Diwali festival and it was perceived that nose pollution rose up to 80dB which was two times more than levels during normal days i.e. 59- 69 dB

1.1.2 Need of study: It has been perceived from past few years that the rate at which noise pollution across India has grown is alarming due to severe unsafe web of various sources of noise creating objects like vehicles, equipment's in industries or simply human noise play a major role in disrupting human peace. Levels of noise are extremely higher in all cities of India .Only few cities are such that can be emphasized where noise monitoring has started due to which they show some enhancement in decrease in level but mostly affected areas are small and medium sized towns which suffer from phenomenal spurt in pollution in very critical manner .One of the major reasons responsible for increase in noise pollution is ever increasing population that has led to increase in vehicle demand thereby causing congestion on roads ,apart from this increase in population has increased demand for goods which have ultimately

led to increase in number of industries. Due to increase in immense number of vehicles, industries and manufacturing units has resulted in excess assembly of noise in surroundings thus creating noise pollution as a state of national emergency across various cities around the country including university campus also. For case of LPU campus, it lies in district Phagwara of state Punjab, where there are multiple number of large and small scale industries producing goods in addition to producing enormous quantities of sound that become unbearable for surrounding area. Also on highways majority of vehicles play throughout the day, their horns ringing during majority of traffic jams on highway surrounding LPU. No doubt this sound is found outside LPU campus. Inside LPU campus major cause of pollution is due to live noise produced to assembly of persons at any place. No doubt one thinks that its intensity will not be that much severe but on measuring it has been found that it is really above permissible limits and continuous exposure under such conditions can lead to dangerous side effects. A lot needs to be done to control this ever growing menace in India. No doubt less research in this field has been done but at the same time Noise pollution is also one of the major issues. It can be avoided but its effects cannot be neglected. People need to be made aware about hard consequences of this environmental concern which people are taking on lighter note considering air and water pollution. Noise pollution affects overall ambience of a place which does not remain health thereby these prolonged subjection to such conditions can lead to severe mental and psychological problems that once out of control can prove to be fatal for anyone. There for this issue should be given same importance that has been given to other environmental problems. Several NGO's have come forward regarding this issue but still less research work is available in this field. This thesis is all about measuring the intensity of noise in lovely professional university. As we all know that lovely professional university has more than 800 acre campus comprising of huge number of buildings and open areas like parks, stalls, kiosks, parking areas etc. were performing noise zoning was an interesting experience. LPU campus is a very huge university campus both in terms of area and number of students studying and residing in its hostels, so monitoring of noise is necessary in order to keep a continuous track about noise levels and to help in decrease in these levels. The results obtained have been simultaneously analysed graphically in order to interpolate results properly.

1.1.3 Approach and goal: It is resolved that specific noise levels are impeding to the general wellbeing, security and welfare and are in opposition to people in general intrigue. Along these lines, dazzling proficient university proclaims that making, keeping up, bringing about or permitting to make, keep up or bring on any clamor in a way not in congruity with the

arrangements of this foundation, which is an open aggravation and might be culpable all things considered. With a specific end goal to control pointless, extreme as well as irritating clamor in the City, it is proclaimed to be the approach of the college to forbid such commotion created by the sources. In this way an endeavor is made by me with a specific end goal to highlight the territories where overabundance clamor is made so that different strides can be taken keeping in mind the end goal to bring down the unsafe impacts of this abundance commotion. Noise zoning is much the same as my objective keeping in mind the end goal to minimize commotion levels and attempt to alleviate the impacts of noise to give a protected and sound educative environment with no unsettling influence so that everybody whether personnel or understudies can have the capacity to study and work legitimately

1.1.4 Scope of study: The scope of this project is as follows

- Focus on intensity of sound levels in LPU campus : This research focuses on measurement of Noise intensity in LPU campus at each and every place .LPU campus comprises of 58 multistoried blocks .Each blocks are fully equipped to cater needs of students and faculties . In campus Apart from restaurants and canteens there are separate places where large number of kiosks and stalls are present where students gather and have their lunch and refreshments .Campus also contains 8 parking places with huge intake of vehicles .With large number of students daily in campus ,it can be easily imagined that noise production can also be large .In this project major focus will be given on measuring on intensity of noise at each place for three consecutive days inside LPU campus .

- Focus on noise intensity during peak hours : Noise Reading in each research area is taken in three intervals i.e. at peak hours which means the time at which most of students were out of lecture halls , the time intervals were found to be :
 - Morning time: (9 to 10) am, at this time most of students were found coming to college and waiting for their lecture to start outside their respective lecture rooms.
 - Lunch time: (12am to 1pm) at this time everyone was found either in corridors of blocks, or in canteen area or sitting on stairs.

- Off time or evening time : (4 to 5) pm ,at this time students were found rushing out of their class rooms creating lot of noise
- Determination of noise variation: Variation in noise will be determined and plotted graphically to determine the point of time and place where maximum noise is found in campus.
- To focus on all emission noise producing sources around campus to understand the extent of problem and its comparison with earlier data.
- Continuous monitoring at different monitoring stations will be done for 3 consecutive days to get representative data on basis of daily variations.
- All the point sources leading to pollution will be highlighted figuring out their origins and their effects.

1.2 Sound and Noise: Sound is formed by oscillations of air, which can be observed by human ear. Humans are able to hear a sound within the frequency range of 20 Hertz (HZ) to 20,000 HZ. Sound is expressed in decibels, dB (A) which is a logarithmic scale. To the human ear a sound reduction by 10 dB (A) will have an approximate effect of halving the subject noise level (while reducing the sound energy with 90%). Faint sounds such as rustling leaves have a loudness of approximately 20 dB (A) and loud music, such as in a disco, of 100 dB (A). Sound has multiple roles. Sound is a source of information but can also be disturbing. It can be pleasant as well as annoying, the same sound can be useful for one but unwanted for somebody else. The consequences to health by noise are:

- I. Loss of hearing (levels exceeding 85 dB (A) and a long exposure time)
- II. Stress related health effects like hypertension, cardiovascular problems and influence on birth weights.
- III. Sleep disturbance

1.3 Characteristics of Noise: The environmental noise exhibits varying characteristics like steady, uniform, and intermittent and so on, depending upon its generating sources. The characteristics of noise is defined in terms of its amplitude, duration, frequency, loudness etc. Based on the defining parameters on acoustical signature can have different types of noise characteristics, i.e.; Impact noise and continuous noise. The impact noise (also known as Impulsive or Explosive noise) has duration of less than 0.5 second but high amplitude with a

high risk of damage to hearing. Noise of these characteristics is predominant in wide range of industrial operations (e.g. material handling, metal piercing, forming, stamping, crushing etc.) .Based on the decay characteristics, the impact noise is further classified as Non reverberant and reverberant impulse .The Impact noise having number of impulses exceeding 10 per second is treated to be continuous .the continuous noise on the other hand exists without any interruption and has very unpleasant character ,which is classified into three categories i.e. Friction noise , Reciprocating noise and Air turbulence noise .People also frequently expose to some special noise environment that lies outside range (Eg Infrasound and ultrasound) or to sound of very short duration (Eg Sonic boom) The focusing of infrasound releases great energy which is capable of demolishing building .Exposure to ultrasound may cause adverse health effects .

1.4 Noise in urban areas: Environment in urban areas abounds with its own source of noise that exists in the entire urban atmosphere .the distribution pattern of community noise is quite complex and differ from city to city. A noise base exists for twenty four hours period of day and varies in different localities during different hours. Various sources that contribute to noise in urban areas are traffic ,industrial ,commercial social and political activities .These types of noise are generated through racing vehicles ,loudspeakers ,chaotic shrieks of tiers ,myriad of horns automatic foundation diggers ,blaring loudspeakers ,chaotic shrieks of tiers , mill sirens ,marriage bands ,religious sermons ,machineries railway train landing and takeoff of aeroplanes ,music systems ,firecrackers ,domestic activities ,use of home appliances ,loud conversation ,barking dogs ,children screams ,electrical substations ,power plants ,shopping counters and so on . in these areas it has been found that noise increases during day and evening hours because of increased activities and also for general widespread city traffic . The noise attenuates through scattering and reflection among the buildings and many sources blend into a general noise pattern . During day time the noise in urban areas exhibits intermittent pattern and steady level during night. At peripheral localities of urban areas, the noise level drops appreciably.

1.5 General effects of noise on environment:

Noise is found almost everywhere, not just in industrial estate. Thunder is the loudest natural sound we hear which sometimes reaches the thresh hold of discomfort. The environmental

noise is extremely variable in magnitude and nature. The amplitude and extent of noise depends on nature of its source and its characteristics.

The typical noise sources contributing to environmental noise are –

- Industrial or occupational noise.
- Construction and mining noise.
- Household noise
- Transportation or operational noise.
- Community background noise and gathering of people

The use of machineries and wide range of equipment's in industries of various kinds provide a composite source of noise that has complicated configuration .the transportation system contributes about 70% of operational noise out of which 55% is contributed by road traffic alone . The rapid progress in exploration ,urban development and use of heavy mining and construction equipment's have contributed high level of noise to environment .A wide range of community and household noises ,that varies extremely with the hours of the day are constantly polluting the urban environment .Table 1.3.1 shows the percentage contribution of various noise sources .

Sources	Motor Vehicles	Aircraft	Voices	Radio and T.V	Home maintenance	Others
Percentage	55%	15%	10%	2%	2%	16%

Some of the major effects of noise on environment are

- Noise contamination influences both wellbeing and conduct. Undesirable sound can harm mental wellbeing. Clamor contamination can bring about inconvenience, hypertension, high anxiety levels, and tinnitus, listening to misfortune, rest unsettling influences, and other unsafe impacts. Moreover, stress and hypertension are the main sources to medical issues.
- Sound gets to be distinctly undesirable when it either meddles with ordinary exercises, for example, dozing, discussion, or upsets or decreases one's personal satisfaction.
- Chronic presentation to commotion may bring about noisy actuated listening to misfortune. More established guys presented to noteworthy word related commotion exhibit more

fundamentally diminished listening to affectability than their non-uncovered companions, however contrasts in listening to affectability diminish with time and the two gatherings are vague by age 79.

- A correlation of Maaban tribesmen, who were unimportantly presented to transportation or mechanical clamor, to a run of the mill U.S. populace demonstrated that constant introduction to respectably abnormal amounts of natural commotion adds to listening to misfortune.
- High commotion levels can add to cardiovascular impacts and presentation to tolerably abnormal states amid a solitary eight-hour time frame causes a factual ascent in pulse of five to ten points and an expansion in stress, and vasoconstriction prompting to the expanded circulatory strain noted above, and also to expanded frequency of coronary artery diseases .
- Noise contamination likewise is a reason for inconvenience.
- Noise can detrimentally affect wild creatures, expanding the danger of death by changing the fragile adjust in predator or prey discovery and evasion, and meddling the utilization of the sounds in correspondence, particularly in connection to multiplication and in route. Acoustic overexposure can prompt to brief or lasting loss of hearing.
- An effect of excess noise on wild creature life is the decrease of usable dwelling place that loud regions may bring about, which on account of jeopardized species might be a piece of the way to annihilation. Commotion contamination has brought about the passing of specific types of whales that stranded themselves in the wake of being presented to the boisterous sound of military.

CHAPTER 2

LITERATURE REVIEW

Pichai Pamanikabud 1999 et al did modelling of urban area stop and go traffic noise for a road network present in city center of Bangkok and his analysis consisted of analysis of noise levels produced from different types of vehicles and the values obtained were used from development of stop and go simulation model thus characterizing an area into acceleration and deceleration lanes using traffic characteristics and lane dimensions.

Erik M Solomons 2009 et al performed engineering modelling of traffic noise for city of Amsterdam from which noise maps and sound exposure distributions were determined and it was found that large sound exposures were faced by buildings adjacent to roads, also it was concluded that due to redistribution of traffic one achieve low sound exposures in these areas due to which annoyance percentage of people dwelling in these areas got reduced from 23% to 18%.

Z Mekawa 1968 et al studied noise reduction process by using screens between sound source and exposure areas and it was found that considerable amount of noise was reduced thereby paving way for usage of screen in noisy areas for reduction of noise .Screen used was independent upon type of material used but helped in noise reduction up to a larger extent thus creating new technology called acoustics and sound proofing using screens .However more thickness of screen led to increase in noise reduction to a greater extent.

Yvonne de kluizenaar 2010 et al studied urban road traffic noise and annoyance by studying the effect of relatively quiet façade on annoyance response .Logistic regression was performed in large population based study in order to study the association between road traffic noise at most of the places and the annoyance caused in two subgroups 1) group with large difference in road traffic noise between most and least exposed façade $Q > 10$ dB and 2) sub group with less noise façade $Q < 10$ dB. Questionnaire data that was obtained was linked to individual exposure based on detailed spatial data (GIS) and standard modelling techniques annoyance was found more in group 1 and difference in response seemed to increase with increasing Q .Results found indicated that it may benefit from quite façade to the dwellers.

U.J Kurze and G.S Anderson 1970 et al studied extend of sound attenuation by barriers by comparing experimental data along with proposed engineering scheme with results of geometric theory of diffraction and it was found that sound transmission through a barrier was

found to be negligible for a typical automotive traffic noise spectrum if mass per unit area of barrier exceeds 4lb/ft^2 .

M A Burges 1977 et al predicted noise for urban traffic conditions related to measurement in Sydney Metropolitan area by developing a method for prediction of noise levels at national physical laboratory (NPL) using road traffic noise values in Sydney metropolitan area. Multiple regression analysis was also used permitting new graphical representation for determination of L_{10} of urban traffic.

Rajiv B Hanushal performed assessment of noise pollution indices in city of Kolhapur, India by performing day time urban noise quality assessment at Kolhapur for five major zones i.e. educational, commercial cum residential. Industrial cum residential, recreational and silent zone. By determining noise pollution indices at all zones it was found that highest value was recorded at industrial cum residential zone followed by commercial cum residential and then by educational zone clearly indicating alarming situation for Kolhapur.

O Gundodgu 2004 et al Used vehicle composition for development of noise prediction technique using inherent procedures by taking reading daily in proper manual manner along with finding number of vehicles at four heaviest traffic points in Erzuram area located in Turkey and then using vehicle noise emission standards two prediction models were developed and thus relatively good agreement was found in between them .

Campbell Steele 1999 et al researched out a basic audit of some traffic sound anticipation models by considering activity forecast models of year 1950 and 1960 year which were intended to anticipate single vehicle sound weight level (L_p) being founded on steady solid speed and zero acceleration .After this models created were not planned to single sound level but rather to foresee proportionate or normal sound levels for movement over picked period yet comes about anticipated hindered and differing stream conditions . In this audit it was seen that early models anticipated straight levels however later models anticipated A weightage levels as early models utilized one point sources yet later models utilized two fold point sources

D. Banerjee 2008 et al performed appraisal and spatial-temporal distribution mapping of urban traffic noise of entire Asansol city of west Bengal .Based on monitoring and mapping of total 35 locations for collection of data and classifying it into residential, commercial and industrial, sensitive and mixed area according to national regulatory standards. The computed data was mapped using Geographic information system to allow imagining besides documentation of degree in addition to circulation of pollution caused due to harmful noise through area .Having

noise levels around all stations to be higher than prescribed limits with schools , hospitals and industries subjected to higher noise throughout the day thereby highlighting the requirement of performing mitigatory measures across the area.

Guzel Yilmaz 2005 et al mapping of noise using GIS conducted in Sanliurfa city of Turkey for 3 x 4 km area by taking continuously weekly data at 11 stations by using this data preparation of reliable map in shortest span of time was done using interpolation method.

Ritesh Vijay 2014 et al performed evaluation of sound produced by vehicles on national roadway going from urban agglomeration by measuring total volume of traffic and produced sound levels from amid morning ,night and crowning hours .After this Contribution of sound produced by individual vehicle was assessed using passenger car unit alongside it degree of sound contamination and effect of excess noise producing vehicles were evaluated utilizing sound contamination level and movement noise index. Noise levels were observed to be over the permissible values showing appropriate decrease measures to be taken for better arranging and aversion from problem.

Murphy. E 2006 et al performed environmental noise prediction , noise mapping and GIS integration for study area in central Dublin by calculation noise levels separately for day and night using harmonoise prediction method .More ever emphasis was laid integrating noise data with Geographic information system after which results demonstrated that using GIS more accurate and virtualistic maps can be prepared providing more insight details along with being effective in policy decision making particularly in terms of actions that are to be taken in terms excessively high noise levels .

Jantein Stotker 2007 et al performed 3D noise mapping in urban areas by preparing an approach to generate 3D noise maps on the basis of noise impact studies .This proposed concept was proofed by applying it to sample noise impact noise study and from experiences it was found that 3D noise map offered significant insight details where ever 3D noise effects were relevant comparing with 2 d maps that had limitations along with it , it was perceived that more accurate assessment of noise was possible in particular when different floors of building were close to a noise source or behind noise barriers .

F. Farcas 2007 et al determined road traffic noise and mapped Skane region using GIS by creating a noise calculator software package implementation that can easily help in creating noise maps. This noise calculator was based on noise model described in Nordic prediction method for road traffic noise. Since it was a case study, the noise calculator was used to build

both large noise maps for Skane region and in south of Sweden and details noise maps for smaller cities thus helping in highlighting the critical noisy areas so that ultimate action can be taken.

Paulo Henrique Trombata Zannin 2011 et al performed noise mapping at different stages of a freeway redevelopment project by taking case study of Brazil by taking acoustic noise measurements in the areas adjacent to federal highway BR-116, part of which lies within the urban limits of city of Curitiba in southern Brazil. Insitu measurements were taken of noise levels from which noise maps were drawn at different stages of implementation of road restructuring project called green line .The result of mappings were compared with reference noise emission values established by municipal legislation. These maps revealed existence of noise pollution in urban stretch of federal highway in all scenarios thereby being helpful for finding solutions to potential environmental problems related to noise.

Che Wing Law 2011 et al performed three noise mapping in Hong Kong using geographic information system(GIS) ,3D computer graphics and virtual reality technology and wide availability of digital topography and mapping data thereby facilitating the substantial advancement in road traffic noise assessments and data presentation in Hong Kong .In Hong Kong it was found that in most of the places are in close proximity to sky scrapers and 2D noise mappings are inadequate in portraying noise exposure environment thus providing wide scope for 3D noise mapping with GIS and computer graphics capable of handling complex topography ,building geometry and noise screening structures thereby publicizing this method to be user friendly for noise dissemination .

Hina Aslam 2010 et al did potential noise zoning of Rawalpindi city using sound level meter and GIS by measuring noise conditions at particularly seven locations across the city and majorly in two time intervals ie morning 5-7 AM and evening 6-8 PM .After mapping and analysis it was found vehicular traffic to be major cause for noise production across the region leading to various risks and harmful potentials on life .

Bengang Li 2002 et al prepared a GIS based road traffic noise prediction model suitable for use in China based on local environment standards, vehicle types and traffic conditions .This model incorporated integrated GIS system which was used to provide general functions for noise modelling and an addition tool of design were new interaction mode in “WHAT IF “Question/Explanation “format was used. This model prepared was accurate up to 0.8 Dba and offered improvements in efficiency and accuracy of traffic noise assessment and noise design.

Ming Cai and Jingfang Zou 2015 et al performed road traffic noise mapping of Guangzhou China using GIS and GPS in order to develop day and noise road traffic noise maps using speed density relation to estimate traffic volumes from GPS data collected from floating cars along with taking attributes of buildings and roads from GIS . This single vehicle emission model was combined with noise prediction model to formulate general regional noise traffic calculation model accounting for traffic attenuation in an urban area along with filtering of noise sources automatically and performing quick index of individual index of estimation objects .Thereby creating day and noise maps for the city. The accuracy of this model was validated across various other districts and average error between estimated and measured value was found to be less than 2Db.

Joon Hee Ko and Seo II Chang 2011 et al performed noise impact assessment for city of Chungju , Republic of Korea by utilizing noise maps and GIS software by developing road traffic noise map using that noise levels at 25 different locations close to roads were determined and compared with expected levels .After this an excess noise map was developed using generated by comparing road traffic noise map with standard noise map .The areas with excess noise were highlighted using GIS space analysis thus highlighting critical and non-critical areas in the area.

R. Klaeboe and E. Engelen 2004 et al performed noise mapping for the apartments that are exposed to same level of road traffic noise on front side by determining noise levels at each exposed areas of apartments then finding out exposure-effect relationships in order to improve annoyance created by the noise. The quality of each neighborhood area was determined by preparing noise impact maps using GIS thereby enabling experts, politicians and common people to become aware about existing noise status about the area.

Shi- Won Lee 2008 et al performed environmental impact assessment in downtown redevelopment area of South Korea by utilizing noise mapping technique using GIS software by following simple three steps of assessment ie surveying existing noise levels using sound level meter ,predicting noise levels induced by future construction works and predicting noise levels after completion of construction works thereby giving three noise maps separately for three different stages .This mapping technique proved to be efficient in noise developing proper noise mitigation techniques thereby helping in reduction of noise produced in area .

Bo Wang and Jian Kang 2011 et al studied comparative effects of urban morphology on traffic noise distribution through noise mapping by selecting two cities ie UK and China having low

and high urban population density along with high difference in building form and traffic pattern. Here survey areas were of 500 x 500 m² cross-section considering land use, building form, road density and noise source distribution using which GIS maps were formulated and compared. It was perceived that average and minimum noise level found at UK was higher than noise level at China and maximum noise level at China was very high as compared to level at UK.

CHAPTER 3

EQUIPMENTS AND METHODOLOGY

In this project monitoring of noise will be done by sound level meter which is available at environmental engineering lab of the civil department. Apart from it Data will be mapped using GIS software which is installed in computer labs of civil department also it can be easily installed in laptop.

3.1 Sound Level Meter The Sound Level Meter measures sound level in decibels. It can be utilized for exercises, for example,

- Environmental noise research
- Sound level correlations
- examining room acoustics
- Sound detachment displaying
- Sound propagation displaying



FIGURE 3.1 Sound level meter

3.1.1 Sound Level Meter characteristics: From the receiving end station there one can discover silver inbuilt pointed opening in hand barrel which is used for receiving sound. Below the LCD, you will transfer A / C name coined for finding the S / F, Max /. These switches will detect the transition of power go / estimated. The battery is located on the back of sound level meters. A signal output terminal, the station is located. Terminal product information is sent to collect the interface. LCD board shows the noise level DB. Similarly, the marker shown above target / range pointer low battery level. Wind screen is fully brought about by in a high number of false-flag deconstruction. This prevents receiver from any sort of compliance flotsam and Jetsam. Various characteristics of sound level meter are:

- **Power / Range:** Switch the slide switch, the "O / 35-90 / 75-130" determine sensor rotation and Development estimates. The 35-90 area (LO) have been chosen in the round, the sensor is intended to quantify sound levels show 35 90 decibels. When a point to make changes 75-130 (high), the sensor area is to determine the amount of 75 130 decibels sound level range. In deliberately so called the last of the current map will show a warning of the scope is. Continuous change in the alert that appears, fitting.
- **Time Weighting:** S / F switch just below the LCD determine the weight. Moderate estimates specific configuration change "S" is. The noise stable, rapid "weight to be F.» In class, you will most likely have the "S".
- **Maximum hold:** Setting the maximum level of responsibility in Max Max arrest / most dangerous Reset, sound level meters certain weight sensor. The class will be held, will redirect to show, in the case show that constantly check to see repeated. Max flag product no impact sent to change the interface settings for data collection
- **Frequency Weightage:** A / C space that used to make the weight scale. "A" weight construction is human hearing voices that get to go to the most confident about the level. Most regular Occupational Safety and Health Administration (OSHA) and the weight (DEQ) used the environmental quality level for the assessment of his administration. "C" weight scale, for example, motors, explosions and hardware test tools helpers, the helpers. These settings off chance you want to unweight noise level overall sound level meters that will be using voice Installed

3.1.2 Working with a sound level meter: The following procedure is to be followed while using sound level meter

- Power Slide the appropriate range.
- For setting Time weightage switch to S.
- Set a maximum hold level to RESET.
- Set occurrence frequency to "A"

Sound Level meters serves as a single gadget, and you can see the LCD display levels1 sound board. In the event that needs sound level linking data collection, sound level meters and data collection interface can be associated together.



FIGURE 3. 2: Sound level meter available at LPU

3.2 Nature of noise in Lovely professional university campus:

- The basic cause of noise in LPU campus is assembly of students in groups at different places leading to increased sound intensity due to talking, shouting, laughing etc.
- Other secondary cause of noise inside campus roads can be the sound produced by various types of vehicles operating in campus during day time.
- Noise in LPU. campus is mostly found during peak hours ie
 - Morning time (9 – 10) am.
 - Lunch time (12 am – 1 pm).
 - Off time or evening time (4 – 5) pm.
- Also noise is found at the end of every lectures as students come out of their respective classes and gather together in corridors of blocks.
- The noise produced in LPU campus in no doubt of that high level as compared to noise leading to noise pollution but to some extent it's better to control the increasing noise as its effects are very adverse .
- Noise inside the campus is mostly found in excess at following places
 - Staircases present in each block.
 - Corridors of different levels of each and every block.
 - Parks and other sitting areas.
 - Areas near Canteen, stalls and other kiosks.
 - Parking areas.
 - Roads inside campus.

3.3 Ambient noise quality standards

AREA CODE	CATEGORY AREA/ZONE	Sound limits in dB (Day)	Sound limits in dB (Night)
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silent	50	40

Note

- Day time shall mean from 6.00 a.m. to 10.00 p.m.
- Night time shall mean from 10.00 p.m. to 6.00 a.m.
- Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority
- Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

- dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.
- A “decibel” is a unit in which noise is measured.
- “A”, in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

3.4 Procedure followed to perform noise zoning in Lovely professional university campus

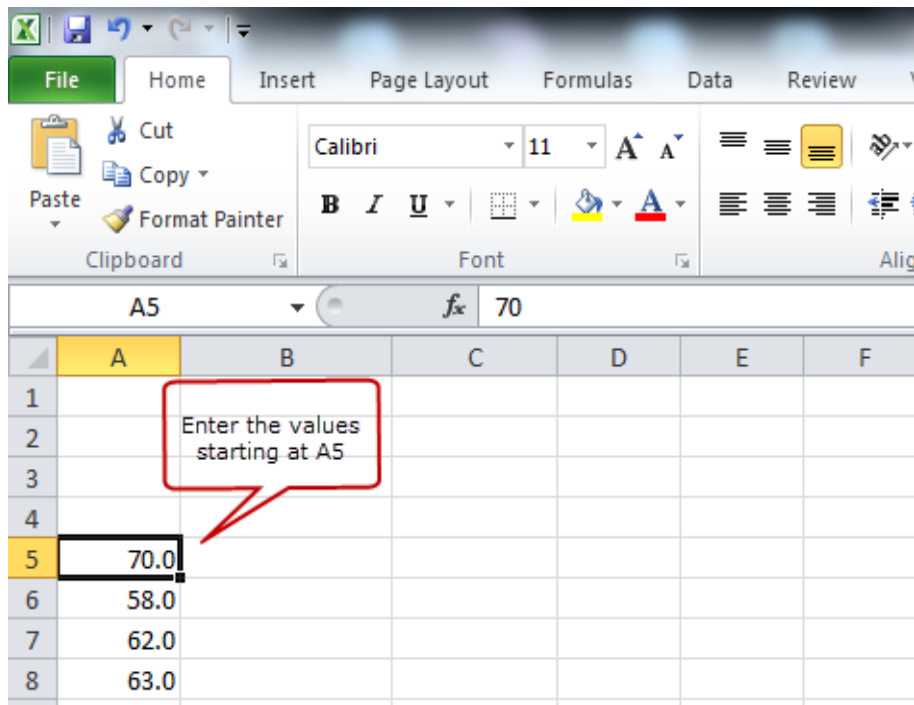
- Places where sound level was to be measured were noted down, it consisted of all the blocks along with adjoining areas i.e. canteens, kiosks areas, parking places were mostly people were found in groups.
- Each block or selected area is to be monitored for three days to determine sound level in decibels.
- Reading in each block or selected area was taken in three intervals i.e. at peak hours which means the time at which most of students were out of lecture halls, the time intervals were found to be :
 - Morning time: (9 to 10) am, at this time most of students were found coming to college and waiting for their lecture to start outside their respective lecture rooms.
 - Lunch time: (12am to 1pm) at this time everyone was found either in corridors of blocks, or in canteen area or sitting on stairs.
 - Off time or evening time: (4 to 5) pm, at this time students were found rushing out of their class rooms creating lot of noise.
- For each selected area three readings will be noted down on the day in which the respective station was monitored.

- After determining sound level in each monitoring station, readings will be tabulated, also mean logarithmic average reading of the day for each station will also be calculated.
- The stations having higher reading values will be highlighted.
- These stations will be properly divided into noise zones in suitable noise ranges from lowest to highest..

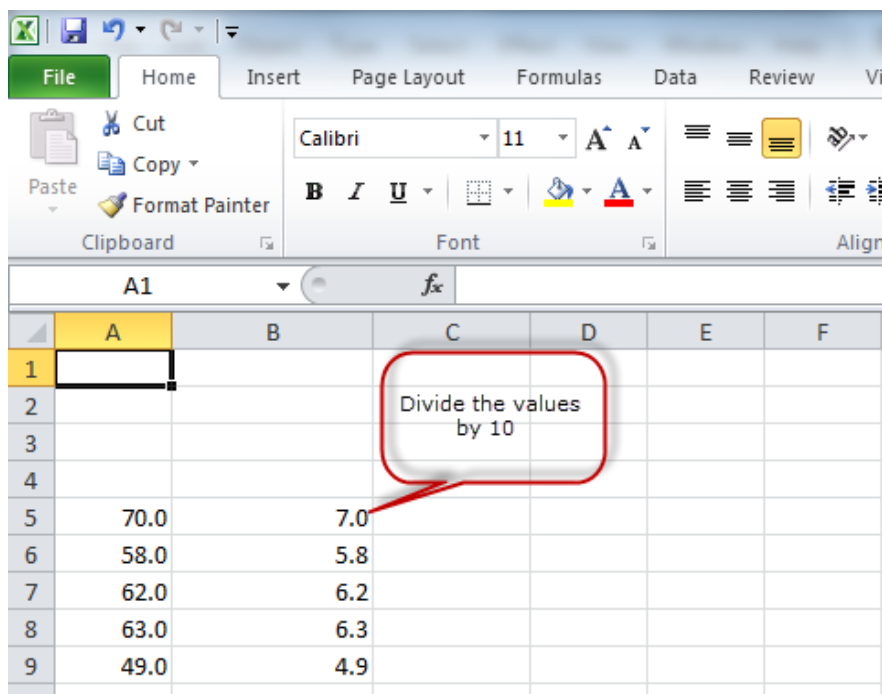
3.5 Noise data averaging: For a day at any station if noise levels are calculated at multiple intervals using the meter and using simple averaging of values will not represent level of energy of record .For example 45, 46, 48,43,78,79,71,33,55 sound level simple averaging will be 55.3 but the energy level of noise 78,79and 71 is high as compared to other values in such a case noise average value is not relevant.

There are some applications where a simple linear average to calculate a value from noise measurements but there are few and often very specific. In this case, what is required is to do a logarithmic average of the values. This can be done if a spreadsheet is used. In this case, it is assumed there are a set of samples, each of which is a 1 second Leq value and the total period is 24 hours. This gives a total of 86400 samples and this number will be used later in the calculation. The simplest way to do this would be to put the numbers into an Excel document with the values in a single column. There are 84,600 values for a complete 24 hour period. The steps below assume that you can work with the 86400 samples in a single pass.

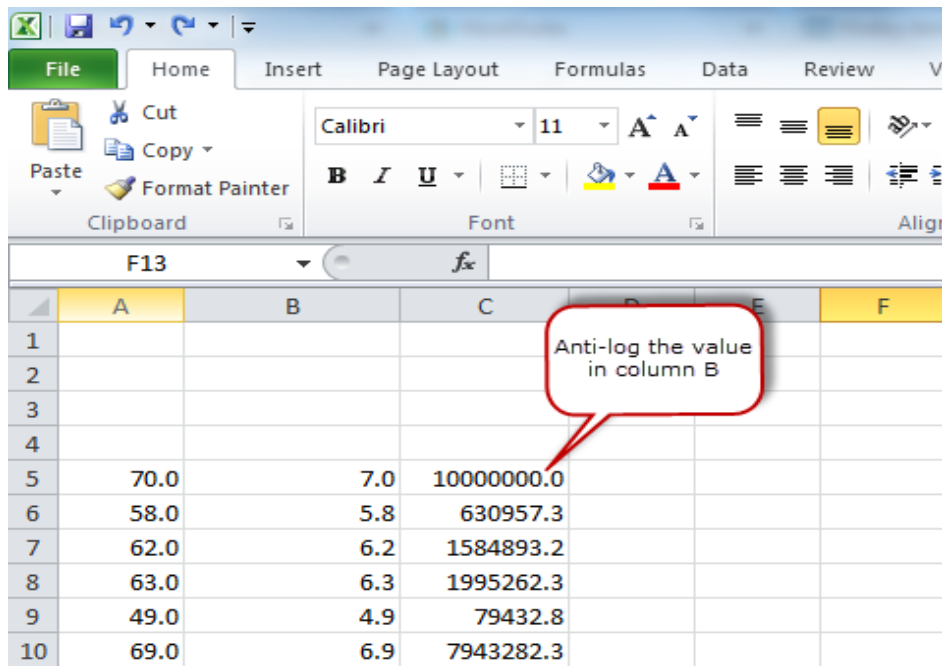
Step 1: Put the individual 1 second samples into column a starting at row 5. Some space is required to put the final calculations later. This will give the values in the cells from A5 to A86405.



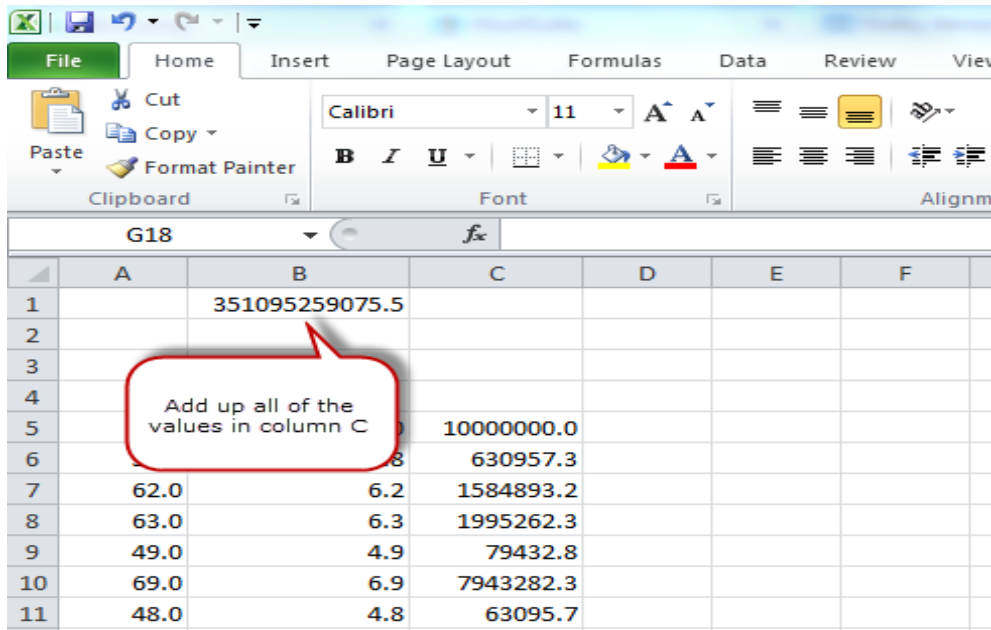
Step 2: In the second column, divide each value by 10. In cell B5 enter $=A5/10$. Copy this into all of the cells from B6 down to B86405.



Step 3: Now anti-log the value from Step 2. In cell C5 enter $=10^{B5}$. Copy this into all of the cells from C6 down to C86405.



Step 4: Add together all of the values in column C. In cell B1 enter $=SUM(C5:C86405)$. This will give the total noise energy over the total 24 hour period.



Step 5: Now divide this total by the number of samples. In cell C1 enter =B1/86400

	A	B	C	D	E	F
1		351095259075.5	4063602.5			
2						
3						
4						
5	70.0	7.0	10000000.0			
6	58.0	5.8	630957.3			
7	62.0	6.2	1584893.2			
8	63.0	6.3	1995262.3			
9	49.0	4.9	79432.8			
10	69.0	6.9	7943282.3			

Step 6: Now to base 10 log this number and multiply it by 10. In cell D1 enter =10*log(C1)

	A	B	C	D	E	F
1		351095259075.5	4063602.5	66.1		
2						
3						
4						
5	70.0	7.0	10000000.0			
6	58.0	5.8	630957.3			
7	62.0	6.2	1584893.2			
8	63.0	6.3	1995262.3			
9	49.0	4.9	79432.8			
10	69.0	6.9	7943282.3			

CHAPTER 4

Observations and Calculations

For each block or station noise reading was recorded for three days at three peak intervals as mentioned in procedure and these readings obtained are recorded below

Table 1) Readings for Monday

<i>Block no/ area selected</i>	Morning (09–10) am	Lunch time (12 am-01 pm)	Off time (4 – 5) pm
<i>1</i>	48.3	60.4	55.1
<i>2 (a)</i>	53.8	53.2	55.6
<i>2 (b)</i>	47	37.8	36
<i>3 (a)</i>	44	42.8	45.9
<i>3 (b)</i>	41.7	43.8	48.7
<i>Park @ 3 (a)</i>	54.3	58.9	62
<i>Park @ 3 (b)</i>	63.2	67	72
<i>Stalls area backside CC</i>	68	74	77
<i>Flyover</i>	38.2	36	38
<i>8 (a)</i>	40.5	37.1	40
<i>8 (b)</i>	37.6	41.2	38
<i>13</i>	59	66	69
<i>Unicenter</i>	72.2	78	82
<i>14</i>	67.6	65.3	73
<i>18</i>	55.1	56.8	59.3
<i>19</i>	47.2	54.3	48.2
<i>25</i>	41	48.3	39.8
<i>26</i>	62.4	52.2	45.2
<i>27</i>	64.6	53.6	48.1
<i>28</i>	60.5	51.1	50.2
<i>29</i>	60	65	52.8

30	41.5	37.1	40
31	36.8	40.2	44
32	37.6	38.7	44.8
33	50.4	58.7	54.8
34	38.1	47.6	45.5
35	62	63	56.1
36	64.1	62	54.1
38	66.1	59.2	56.3
Stalls @ 34	58.3	63	59.2
Park @ 20	66	70	71
Park @ 18	56.3	62.2	58.4
40	48.3	60.4	62.2
Road @ bh2	54.2	50.4	56
55	55.7	49.3	62.4
56	58.1	61.9	63
57	52.9	65	73
Canteen(56 back)	63.2	68.5	54.3
Food court @(41)	68	73.4	70.2
Tunnel @bh5	54	58	55
Tunnel @29	66	60	67
Food court @(30)	62.2	73.8	60.1
Boys hostel 1	50	59.8	53
Boys hostel 2	53.1	58.8	59.3
Boys hostel 3	54.2	52	54.4
Boys hostel 4	56	50.2	54.4
Boys hostel 5	60.5	50.3	51
Boys hostel 6	53.4	55.7	54.8

Table 2) Readings for Wednesday

<i>S. no :</i>	<i>Block no/ area selected</i>	Morning (09-10) am	Lunch time (12 am-01 pm)	Off time (4 – 5) pm
1	1	45.3	59.4	52
2	2 (a)	48	52.2	51.6
3	2 (b)	43	36.8	32
4	3 (a)	41	41.8	42.9
5	3 (b)	38.7	42.8	44.7
6	Park @ 3 (a)	51.3	57.9	59
7	Park @ 3 (b)	60.2	66	68
8	Stalls area backside CC	69.3	76	70
9	Flyover	35.2	35	35
10	8 (a)	37.5	36.1	37
11	8 (b)	34.6	40.2	33
12	13	47.2	57	58
13	Unicenter	69.2	77	81
14	14	64.6	64.3	68
15	18	52.1	55.8	55.3
16	19	44.2	53.3	43.2
17	25	38	47.3	35.8
18	26	59.4	51.2	41.2
19	27	61.6	52.6	44.1
20	28	57.5	50.1	48
21	29	68	72	48.8
22	30	38.5	36.1	35
23	31	33.8	39.2	37
24	32	34.6	37.7	40.8

25	33	47.4	57.7	52.6
26	34	35.1	46.6	41.5
27	35	59	60	52.1
28	36	61.1	61	50.1
29	38	63.1	58.2	52.3
30	<i>Stalls @ 34</i>	55.3	62	55.2
31	<i>Park @ 20</i>	68	71	73
32	<i>Park @ 18</i>	53.3	61.2	54.4
33	40	45.3	59.4	58.2
34	<i>Road @ bh2</i>	51.2	49.4	53
35	55	52.7	48.3	58.4
36	56	55.1	60.9	57
37	57	49.9	72.8	69
38	<i>Canteen(56 back)</i>	60.2	67.5	50.3
39	<i>Food court @(41)</i>	70	70.3	64
40	<i>Tunnel @bh5</i>	53	57	50
41	<i>Tunnel @29</i>	63	62	68
42	<i>Food court @(30)</i>	59.2	72.8	56.1
43	Boys hostel 1	57.1	58.8	59
44	Boys hostel 2	50.1	57.8	53.3
45	Boys hostel 3	51.2	51	50.4
46	Boys hostel 4	53	49.2	48.4
47	Boys hostel 5	57.5	49.3	45
48	Boys hostel 6	50.4	54.7	50.8

Table 3) Readings for Friday

<i>S. no :</i>	<i>Block no/ area selected</i>	Morning (09–10) am	Lunch time (12 am-01 pm)	Off time (4 – 5) pm
<i>1</i>	<i>1</i>	50.3	57.4	58.1
<i>2</i>	<i>2 (a)</i>	55.8	50.2	58.6
<i>3</i>	<i>2 (b)</i>	49	34.8	39
<i>4</i>	<i>3 (a)</i>	46	39.8	48.9
<i>5</i>	<i>3 (b)</i>	43.7	40.8	51.7
<i>6</i>	<i>Park @ 3 (a)</i>	56.3	55.9	65
<i>7</i>	<i>Park @ 3 (b)</i>	65.2	64	75
<i>8</i>	<i>Stalls area backside CC</i>	74.3	72	78
<i>9</i>	<i>Flyover</i>	40.2	33	41
<i>10</i>	<i>8 (a)</i>	42.5	34.1	43
<i>11</i>	<i>8 (b)</i>	39.6	38.2	41
<i>12</i>	<i>13</i>	52.2	55	65
<i>13</i>	<i>Unicenter</i>	74.2	75	78
<i>14</i>	<i>14</i>	69.6	62.3	76
<i>15</i>	<i>18</i>	57.1	53.8	62.3
<i>16</i>	<i>19</i>	49.2	51.3	51.2
<i>17</i>	<i>25</i>	43	45.3	42.8
<i>18</i>	<i>26</i>	64.4	49.2	48.2
<i>19</i>	<i>27</i>	66.6	50.6	51.1
<i>20</i>	<i>28</i>	62.5	48.1	53.2
<i>21</i>	<i>29</i>	70	66	55.8
<i>22</i>	<i>30</i>	43.5	34.1	43
<i>23</i>	<i>31</i>	38.8	37.2	47
<i>24</i>	<i>32</i>	39.6	35.7	47.8
<i>25</i>	<i>33</i>	52.4	55.7	57.8
<i>26</i>	<i>34</i>	40.1	44.6	48.5

27	35	64	60	59.1
28	36	66.1	59	57.1
29	38	68.1	56.2	59.3
30	<i>Stalls @ 34</i>	60.3	60	62.2
31	<i>Park @ 20</i>	75	73	71
32	<i>Park @ 18</i>	58.3	59.2	61.4
33	40	50.3	57.4	65.2
34	<i>Road @ bh2</i>	56.2	47.4	59
35	55	57.7	46.3	65.4
36	56	60.1	58.9	66
37	57	54.9	70.8	78
38	<i>Canteen(56 back)</i>	65.2	65.5	57.3
39	<i>Food court @(41)</i>	75	68.3	71
40	<i>Tunnel @bh5</i>	66.2	74.1	58
41	<i>Tunnel @29</i>	68	55.3	65
42	<i>Food court @(30)</i>	64.2	70.8	63.1
43	Boys hostel 1	62.1	56.8	66
44	Boys hostel 2	55.1	55.8	62.3
45	Boys hostel 3	56.2	49	57.4
46	Boys hostel 4	58	47.2	57.4
47	Boys hostel 5	62.5	47.3	54
48	Boys hostel 6	55.4	52.7	57.8

Table 4) Logarithmic average values of noise levels for Monday

<i>Block no/ area selected</i>	<i>Morning (09-10) am</i>	<i>Lunch time (12-5)</i>	<i>Off time (4 -5) pm</i>	<i>Mornin g reading</i>	<i>Lunch time/ 10</i>	<i>off time/ 10</i>	<i>Morning antilog value</i>	<i>Lunch time antilog</i>	<i>Off time anti log value</i>	<i>Sum of readings</i>	<i>Sum/Total no of samples</i>	<i>Monday final reading(Log value)</i>
1	48.3	60.4	55.1	4.83	6.04	5.51	67608.3	1096478	323593.7	1487680.2	495893.4	57.0
2 (a)	53.8	53.2	55.6	5.38	5.32	5.56	239883.3	208930	363078.1	811891.0	270630.3	54.3
2 (b)	47	37.8	36	4.7	3.78	3.6	50118.7	6026	3981.1	60125.4	20041.8	43.0
3 (a)	44	42.8	45.9	4.4	4.28	4.59	25118.9	19055	38904.5	83078.0	27692.7	44.4
3 (b)	41.7	43.8	48.7	4.17	4.38	4.87	14791.1	23988	74131.0	112910.4	37636.8	45.8
Park @ 3 (a)	54.3	58.9	62	5.43	5.89	6.2	269153.5	776247	1584893.2	2630293.8	876764.6	59.4
Park @ 3 (b)	63.2	67	72	6.32	6.7	7.2	2089296.1	5011872	15848931.9	22950100.4	7650033.5	68.8
Stalls area	68	74	77	6.8	7.4	7.7	6309573.4	25118864	50118723.4	81547161.1	27182387.0	74.3
Flyover	38.2	36	38	3.82	3.6	3.8	6606.9	3981	6309.6	16897.6	5632.5	37.5
8 (a)	40.5	37.1	40	4.05	3.71	4	11220.2	5129	10000.0	26348.8	8782.9	39.4
8 (b)	37.6	41.2	38	3.76	4.12	3.8	5754.4	13183	6309.6	25246.5	8415.5	39.3
13	59	66	69	5.9	6.6	6.9	794328.2	3981072	7943282.3	12718682.3	4239560.8	66.3
Unicenter	72.2	78	82	7.22	7.8	8.2	16595869.1	63095734	158489319.2	238180922.8	79393640.9	79.0
14	67.6	65.3	73	6.76	6.53	7.3	5754399.4	3388442	19952623.1	29095464.1	9698488.0	69.9
18	55.1	56.8	59.3	5.51	5.68	5.93	323593.7	478630	851138.0	1653361.8	551120.6	57.4
19	47.2	54.3	48.2	4.72	5.43	4.82	52480.7	269153	66069.3	387703.6	129234.5	51.1
25	41	48.3	39.8	4.1	4.83	3.98	12589.3	67608	9549.9	89747.5	29915.8	44.8
26	62.4	52.2	45.2	6.24	5.22	4.52	1737800.8	165959	33113.1	1936872.6	645624.2	58.1
27	64.6	53.6	48.1	6.46	5.36	4.81	2884031.5	229087	64565.4	3177683.7	1059227.9	60.2
28	60.5	51.1	50.2	6.05	5.11	5.02	1122018.5	128825	104712.9	1355556.3	451852.1	56.5
29	60	65	52.8	6	6.5	5.28	1000000.0	3162278	190546.1	4352823.7	1450941.2	61.6
30	41.5	37.1	40	4.15	3.71	4	14125.4	5129	10000.0	29254.0	9751.3	39.9
31	36.8	40.2	44	3.68	4.02	4.4	4786.3	10471	25118.9	40376.5	13458.8	41.3

Block no/ area selected	Morning (09-10) am	Lunch time (12 am-	Off time (4 - 5) pm	Morning reading/ 10	Lunch time/ 10	off time/ 10	Morning antilog value	Lunch time antilog	Off time anti log value	Sum of readings	Sum/Total no of samples	Monday final reading(Log value)
32	37.6	38.7	44.8	3.76	3.87	4.48	5754.4	7413	30199.5	43367.0	14455.7	41.6
33	50.4	58.7	54.8	5.04	5.87	5.48	109647.8	741310	301995.2	1152953.2	384317.7	55.8
34	38.1	47.6	45.5	3.81	4.76	4.55	6456.5	57544	35481.3	99481.9	33160.6	45.2
35	62	63	56.1	6.2	6.3	5.61	1584893.2	1995262	407380.3	3987535.8	1329178.6	61.2
36	64.1	62	54.1	6.41	6.2	5.41	2570395.8	1584893	257039.6	4412328.6	1470776.2	61.7
38	66.1	59.2	56.3	6.61	5.92	5.63	4073802.8	831764	426579.5	5332146.1	1777382.0	62.5
Stalls @ 34	58.3	63	59.2	5.83	6.3	5.92	676083.0	1995262	831763.8	3503109.1	1167703.0	60.7
Park @ 20	66	70	71	6.6	7	7.1	3981071.7	10000000	12589254.1	26570325.8	8856775.3	69.5
Park @ 18	56.3	62.2	58.4	5.63	6.22	5.84	426579.5	1659587	691831.0	2777997.4	925999.1	59.7
40	48.3	60.4	62.2	4.83	6.04	6.22	67608.3	1096478	1659586.9	2823673.4	941224.5	59.7
Road @ bh2	54.2	50.4	56	5.42	5.04	5.6	263026.8	109648	398107.2	770781.8	256927.3	54.1
55	55.7	49.3	62.4	5.57	4.93	6.24	371535.2	85114	1737800.8	2194449.9	731483.3	58.6
56	58.1	61.9	63	5.81	6.19	6.3	645654.2	1548817	1995262.3	4189733.2	1396577.7	61.5
57	52.9	65	73	5.29	6.5	7.3	194984.5	3162278	19952623.1	23309885.3	7769961.8	68.9
Canteen(56 back	63.2	68.5	54.3	6.32	6.85	5.43	2089296.1	7079458	269153.5	9437907.5	3145969.2	65.0
Food court @(41	68	73.4	70.2	6.8	7.34	7.02	6309573.4	21877616	10471285.5	38658475.2	12886158.4	71.1
Tunnel @bh5	54	58	55	5.4	5.8	5.5	251188.6	630957	316227.8	1198373.8	399457.9	56.0
Tunnel @29	66	60	67	6.6	6	6.7	3981071.7	1000000	5011872.3	9992944.0	3330981.3	65.2
Food court @(30	62.2	73.8	60.1	6.22	7.38	6.01	1659586.9	23988329	1023293.0	26671209.1	8890403.0	69.5
Boys hostel 1	50	59.8	53	5	5.98	5.3	100000.0	954993	199526.2	1254518.8	418172.9	56.2
Boys hostel 2	53.1	58.8	59.3	5.31	5.88	5.93	204173.8	758578	851138.0	1813889.4	604629.8	57.8
Boys hostel 3	54.2	52	54.4	5.42	5.2	5.44	263026.8	158489	275422.9	696939.0	232313.0	53.7
Boys hostel 4	56	50.2	54.4	5.6	5.02	5.44	398107.2	104713	275422.9	778242.9	259414.3	54.1
Boys hostel 5	60.5	50.3	51	6.05	5.03	5.1	1122018.5	107152	125892.5	1355062.9	451687.6	56.5
Boys hostel 6	53.4	55.7	54.8	5.34	5.57	5.48	218776.2	371535	301995.2	892306.6	297435.5	54.7

Table 5) Logarithmic average values of noise levels for Wednesday

S. no	Block no/ area selected	Morning (09-10) am	Lunch time (12 am-01 pm)	Off time (4-5) pm	Morning reading /10	Lunch time/ 10	off time/ 10	Morning antilog value	Lunch time antilog value	Off time anti log value	Sum of readings	Sum/Total no of samples	Wednes day final reading(Log value)
1	1	45.3	59.4	52	4.53	5.94	5.2	33884.4	870964	158489	1063337.3	354445.8	55.5
2	2 (a)	48	52.2	51.6	4.8	5.22	5.16	63095.7	165959	144544	373598.4	124532.8	51.0
3	2 (b)	43	36.8	32	4.3	3.68	3.2	19952.6	4786	1585	26323.8	8774.6	39.4
4	3 (a)	41	41.8	42.9	4.1	4.18	4.29	12589.3	15136	19498	47223.3	15741.1	42.0
5	3 (b)	38.7	42.8	44.7	3.87	4.28	4.47	7413.1	19055	29512	55979.8	18659.9	42.7
6	Park @ 3 (a)	51.3	57.9	59	5.13	5.79	5.9	134896.3	616595	794328	1545819.5	515273.2	57.1
7	Park @ 3 (b)	60.2	66	68	6.02	6.6	6.8	1047128.5	3981072	6309573	11337773.7	3779257.9	65.8
8	Stalls area backside CC	69.3	76	70	6.93	7.6	7	8511380.4	39810717	10000000	58322097.4	19440699.1	72.9
9	Flyover	35.2	35	35	3.52	3.5	3.5	3311.3	3162	3162	9635.9	3212.0	35.1
10	8 (a)	37.5	36.1	37	3.75	3.61	3.7	5623.4	4074	5012	14709.1	4903.0	36.9
11	8 (b)	34.6	40.2	33	3.46	4.02	3.3	2884.0	10471	1995	15350.6	5116.9	37.1
12	13	47.2	57	58	4.72	5.7	5.8	52480.7	501187	630957	1184625.3	394875.1	56.0
13	Unicenter	69.2	77	81	6.92	7.7	8.1	8317637.7	50118723	125892541	184328902.3	61442967.4	77.9
14	14	64.6	64.3	68	6.46	6.43	6.8	2884031.5	2691535	6309573	11885139.8	3961713.3	66.0
15	18	52.1	55.8	55.3	5.21	5.58	5.53	162181.0	380189	338844	881214.6	293738.2	54.7
16	19	44.2	53.3	43.2	4.42	5.33	4.32	26302.7	213796	20893	260991.9	86997.3	49.4
17	25	38	47.3	35.8	3.8	4.73	3.58	6309.6	53703	3802	63814.6	21271.5	43.3
18	26	59.4	51.2	41.2	5.94	5.12	4.12	870963.6	131826	13183	1015971.8	338657.3	55.3
19	27	61.6	52.6	44.1	6.16	5.26	4.41	1445439.8	181970	25704	1653113.8	551037.9	57.4
20	28	57.5	50.1	48	5.75	5.01	4.8	562341.3	102329	63096	727766.4	242588.8	53.8
21	29	68	72	48.8	6.8	7.2	4.88	6309573.4	15848932	75858	22234363.1	7411454.4	68.7

S. no :	Block no/ area selected	Morning (09-10) am	Lunch time (12 am-01 pm)	Off time (4-5) pm	Morning reading /10	Lunch time/ 10	off time/ 10	Morning antilog value	Lunch time antilog value	Off time anti log value	Sum of readings	Sum/Total no of samples	Wednes day final reading(Log value)
22	30	38.5	36.1	35	3.85	3.61	3.5	7079.5	4074	3162	14315.5	4771.8	36.8
23	31	33.8	39.2	37	3.38	3.92	3.7	2398.8	8318	5012	15728.3	5242.8	37.2
24	32	34.6	37.7	40.8	3.46	3.77	4.08	2884.0	5888	12023	20795.1	6931.7	38.4
25	33	47.4	57.7	52.6	4.74	5.77	5.26	54954.1	588844	181970	825767.8	275255.9	54.4
26	34	35.1	46.6	41.5	3.51	4.66	4.15	3235.9	45709	14125	63070.1	21023.4	43.2
27	35	59	60	52.1	5.9	6	5.21	794328.2	1000000	162181	1956509.2	652169.7	58.1
28	36	61.1	61	50.1	6.11	6.1	5.01	1288249.6	1258925	102329	2649504.3	883168.1	59.5
29	38	63.1	58.2	52.3	6.31	5.82	5.23	2041737.9	660693	169824	2872255.8	957418.6	59.8
30	Stalls @ 34	55.3	62	55.2	5.53	6.2	5.52	338844.2	1584893	331131	2254868.5	751622.8	58.8
31	Park @ 20	68	71	73	6.8	7.1	7.3	6309573.4	12589254	19952623	38851450.7	12950483.6	71.1
32	Park @ 18	53.3	61.2	54.4	5.33	6.12	5.44	213796.2	1318257	275423	1807475.8	602491.9	57.8
33	40	45.3	59.4	58.2	4.53	5.94	5.82	33884.4	870964	660693	1565541.5	521847.2	57.2
34	Road @ bh2	51.2	49.4	53	5.12	4.94	5.3	131825.7	87096	199526	418448.3	139482.8	51.4
35	55	52.7	48.3	58.4	5.27	4.83	5.84	186208.7	67608	691831	945648.0	315216.0	55.0
36	56	55.1	60.9	57	5.51	6.09	5.7	323593.7	1230269	501187	2055049.7	685016.6	58.4
37	57	49.9	72.8	69	4.99	7.28	6.9	97723.7	19054607	7943282	27095613.2	9031871.1	69.6
38	Canteen(56 back)	60.2	67.5	50.3	6.02	6.75	5.03	1047128.5	5623413	107152	6777693.7	2259231.2	63.5
39	Food court @ (41)	70	70.3	64	7	7.03	6.4	10000000.0	10715193	2511886	23227079.5	7742359.8	68.9
40	Tunnel @bh5	53	57	50	5.3	5.7	5	199526.2	501187	100000	800713.5	266904.5	54.3
41	Tunnel @29	63	62	68	6.3	6.2	6.8	1995262.3	1584893	6309573	9889729.0	3296576.3	65.2
42	Food court @ (30)	59.2	72.8	56.1	5.92	7.28	5.61	831763.8	19054607	407380	20293751.2	6764583.7	68.3
43	Boys hostel 1	57.1	58.8	59	5.71	5.88	5.9	512861.4	758578	794328	2065767.2	688589.1	58.4
44	Boys hostel 2	50.1	57.8	53.3	5.01	5.78	5.33	102329.3	602560	213796	918685.1	306228.4	54.9
45	Boys hostel 3	51.2	51	50.4	5.12	5.1	5.04	131825.7	125893	109648	367366.0	122455.3	50.9
46	Boys hostel 4	53	49.2	48.4	5.3	4.92	4.84	199526.2	83176	69183	351885.7	117295.2	50.7
47	Boys hostel 5	57.5	49.3	45	5.75	4.93	4.5	562341.3	85114	31623	679077.9	226359.3	53.5
48	Boys hostel 6	50.4	54.7	50.8	5.04	5.47	5.08	109647.8	295121	120226	524995.2	174998.4	52.4

Table 6) Logarithmic average values of noise levels for Friday

S. no :	Block no/ area selected	Morning (09-10) am	Lunch time (12 am-01 pm)	Off time (4 - 5) pm	Morning reading g/10	Lunch time/ 10	off time/ 10	Morning antilog value	Lunch time antilog value	Off time anti log value	Sum of readings	Sum/Total no of samples	Friday reading (Log value)
1	1	50.3	57.4	58.1	5.03	5.74	5.81	107151.9	549540.9	645654.2	1302347	434115.7	56.4
2	2 (a)	55.8	50.2	58.6	5.58	5.02	5.86	380189.4	104712.9	724436.0	1209338	403112.7	56.1
3	2 (b)	49	34.8	39	4.9	3.48	3.9	79432.8	3020.0	7943.3	90396	30132.0	44.8
4	3 (a)	46	39.8	48.9	4.6	3.98	4.89	39810.7	9549.9	77624.7	126985	42328.5	46.3
5	3 (b)	43.7	40.8	51.7	4.37	4.08	5.17	23442.3	12022.6	147910.8	183376	61125.3	47.9
6	Park @ 3 (a)	56.3	55.9	65	5.63	5.59	6.5	426579.5	389045.1	3162277.7	3977902	1325967.4	61.2
7	Park @ 3 (b)	65.2	64	75	6.52	6.4	7.5	3311311.2	2511886.4	31622776.6	37445974	12481991.4	71.0
8	Stalls area backside CC	74.3	72	78	7.43	7.2	7.8	26915348.0	15848931.9	63095734.4	105860014	35286671.5	75.5
9	Flyover	40.2	33	41	4.02	3.3	4.1	10471.3	1995.3	12589.3	25056	8351.9	39.2
10	8 (a)	42.5	34.1	43	4.25	3.41	4.3	17782.8	2570.4	19952.6	40306	13435.3	41.3
11	8 (b)	39.6	38.2	41	3.96	3.82	4.1	9120.1	6606.9	12589.3	28316	9438.8	39.7
12	13	52.2	55	65	5.22	5.5	6.5	165958.7	316227.8	3162277.7	3644464	1214821.4	60.8
13	Unicenter	74.2	75	78	7.42	7.5	7.8	26302679.9	31622776.6	63095734.4	121021191	40340397.0	76.1
14	14	69.6	62.3	76	6.96	6.23	7.6	9120108.4	1698243.7	39810717.1	50629069	16876356.4	72.3
15	18	57.1	53.8	62.3	5.71	5.38	6.23	512861.4	239883.3	1698243.7	2450988	816996.1	59.1
16	19	49.2	51.3	51.2	4.92	5.13	5.12	83176.4	134896.3	131825.7	349898	116632.8	50.7
17	25	43	45.3	42.8	4.3	4.53	4.28	19952.6	33884.4	19054.6	72892	24297.2	43.9
18	26	64.4	49.2	48.2	6.44	4.92	4.82	2754228.7	83176.4	66069.3	2903474	967824.8	59.9
19	27	66.6	50.6	51.1	6.66	5.06	5.11	4570881.9	114815.4	128825.0	4814522	1604840.7	62.1
20	28	62.5	48.1	53.2	6.25	4.81	5.32	1778279.4	64565.4	208929.6	2051774	683924.8	58.4

S. no :	Block no/ area selected	Morning (09-10) am	Lunch time (12 am-01 pm)	Off time (4-5) pm	Morning reading g/10	Lunch time/10	off time/10	Morning antilog value	Lunch time antilog value	Off time anti log value	Sum of readings	Sum/Total no of samples	Friday reading (Log value)
21	29	70	66	55.8	7	6.6	5.58	10000000.0	3981071.7	380189.4	14361261	4787087.0	66.8
22	30	43.5	34.1	43	4.35	3.41	4.3	22387.2	2570.4	19952.6	44910	14970.1	41.8
23	31	38.8	37.2	47	3.88	3.72	4.7	7585.8	5248.1	50118.7	62953	20984.2	43.2
24	32	39.6	35.7	47.8	3.96	3.57	4.78	9120.1	3715.4	60256.0	73091	24363.8	43.9
25	33	52.4	55.7	57.8	5.24	5.57	5.78	173780.1	371535.2	602559.6	1147875	382625.0	55.8
26	34	40.1	44.6	48.5	4.01	4.46	4.85	10232.9	28840.3	70794.6	109868	36622.6	45.6
27	35	64	60	59.1	6.4	6	5.91	2511886.4	1000000.0	812830.5	4324717	1441572.3	61.6
28	36	66.1	59	57.1	6.61	5.9	5.71	4073802.8	794328.2	512861.4	5380992	1793664.1	62.5
29	38	68.1	56.2	59.3	6.81	5.62	5.93	6456542.3	416869.4	851138.0	7724550	2574849.9	64.1
30	Stalls @ 34	60.3	60	62.2	6.03	6	6.22	1071519.3	1000000.0	1659586.9	3731106	1243702.1	60.9
31	Park @ 20	75	73	71	7.5	7.3	7.1	31622776.6	19952623.1	12589254.1	64164654	21388218.0	73.3
32	Park @ 18	58.3	59.2	61.4	5.83	5.92	6.14	676083.0	831763.8	1380384.3	2888231	962743.7	59.8
33	40	50.3	57.4	65.2	5.03	5.74	6.52	107151.9	549540.9	3311311.2	3968004	1322668.0	61.2
34	Road @ bh2	56.2	47.4	59	5.62	4.74	5.9	416869.4	54954.1	794328.2	1266152	422050.6	56.3
35	55	57.7	46.3	65.4	5.77	4.63	6.54	588843.7	42658.0	3467368.5	4098870	1366290.0	61.4
36	56	60.1	58.9	66	6.01	5.89	6.6	1023293.0	776247.1	3981071.7	5780612	1926870.6	62.8
37	57	54.9	70.8	78	5.49	7.08	7.8	309029.5	12022644.3	63095734.4	75427408	25142469.4	74.0
38	Canteen(56 back)	65.2	65.5	57.3	6.52	6.55	5.73	3311311.2	3548133.9	537031.8	7396477	2465492.3	63.9
39	Food court @ (41)	75	68.3	71	7.5	6.83	7.1	31622776.6	6760829.8	12589254.1	50972860	16990953.5	72.3
40	Tunnel @bh5	66.2	74.1	58	6.62	7.41	5.8	4168693.8	25703957.8	630957.3	30503609	10167869.7	70.1
41	Tunnel @29	68	55.3	65	6.8	5.53	6.5	6309573.4	338844.2	3162277.7	9810695	3270231.8	65.1
42	Food court @ (30)	64.2	70.8	63.1	6.42	7.08	6.31	2630268.0	12022644.3	2041737.9	16694650	5564883.4	67.5
43	Boys hostel 1	62.1	56.8	66	6.21	5.68	6.6	1621810.1	478630.092	3981071.7	6081512	2027170.6	63.1
44	Boys hostel 2	55.1	55.8	62.3	5.51	5.58	6.23	323593.7	380189.396	1698243.7	2402027	800675.6	59.0
45	Boys hostel 3	56.2	49	57.4	5.62	4.9	5.74	416869.4	79432.8235	549540.9	1045843	348614.4	55.4
46	Boys hostel 4	58	47.2	57.4	5.8	4.72	5.74	630957.3	52480.746	549540.9	1232979	410993.0	56.1
47	Boys hostel 5	62.5	47.3	54	6.25	4.73	5.4	1778279.4	53703.1796	251188.6	2083171	694390.4	58.4
48	Boys hostel 6	55.4	52.7	57.8	5.54	5.27	5.78	346736.9	186208.714	602559.6	1135505	378501.7	55.8

Table 7) Logarithmic average values of noise levels for all three days

Block no/ area selected	Monday final reading(Log value)	Wednesday final reading(Log value)	Weighted mean reading of Friday
<i>1</i>	57.0	55.5	56.4
<i>2 (a)</i>	54.3	51.0	56.1
<i>2 (b)</i>	43.0	39.4	44.8
<i>3 (a)</i>	44.4	42.0	46.3
<i>3 (b)</i>	45.8	42.7	47.9
<i>Park @ 3 (a)</i>	59.4	57.1	61.2
<i>Park @ 3 (b)</i>	68.8	65.8	71.0
<i>Stalls area backside CC</i>	74.3	72.9	75.5
<i>Flyover</i>	37.5	35.1	39.2
<i>8 (a)</i>	39.4	36.9	41.3
<i>8 (b)</i>	39.3	37.1	39.7
<i>13</i>	66.3	56.0	60.8
<i>Unicenter</i>	79.0	77.9	76.1
<i>14</i>	69.9	66.0	72.3
<i>18</i>	57.4	54.7	59.1
<i>19</i>	51.1	49.4	50.7
<i>25</i>	44.8	43.3	43.9
<i>26</i>	58.1	55.3	59.9
<i>27</i>	60.2	57.4	62.1
<i>28</i>	56.5	53.8	58.4
<i>29</i>	61.6	68.7	66.8
<i>30</i>	39.9	36.8	41.8
<i>31</i>	41.3	37.2	43.2
<i>32</i>	41.6	38.4	43.9
<i>33</i>	55.8	54.4	55.8

34	45.2	43.2	45.6
35	61.2	58.1	61.6
36	61.7	59.5	62.5
38	62.5	59.8	64.1
<i>Stalls @ 34</i>	60.7	58.8	60.9
<i>Park @ 20</i>	69.5	71.1	73.3
<i>Park @ 18</i>	59.7	57.8	59.8
40	59.7	57.2	61.2
<i>Road @ bh2</i>	54.1	51.4	56.3
55	58.6	55.0	61.4
56	61.5	58.4	62.8
57	68.90418881	69.6	74.0
<i>Canteen(56 back)</i>	64.9775446	63.5	63.9
<i>Food court @(41)</i>	71.10123465	68.9	72.3
<i>Tunnel @bh5</i>	56.01471034	54.3	70.1
<i>Tunnel @29</i>	65.22572201	65.2	65.1
<i>Food court @(30)</i>	69.48921449	68.3	67.5
Boys hostel 1	56.21355925	58.4	63.1
Boys hostel 2	57.8148955	54.9	59.0
Boys hostel 3	53.66073506	50.9	55.4
Boys hostel 4	54.1399391	50.7	56.1
Boys hostel 5	56.54838209	53.5	58.4
Boys hostel 6	54.73392833	52.4	55.8

Table 8) Final Logarithmic average values of noise levels on basis of logarithmic values of noise readings of all three days

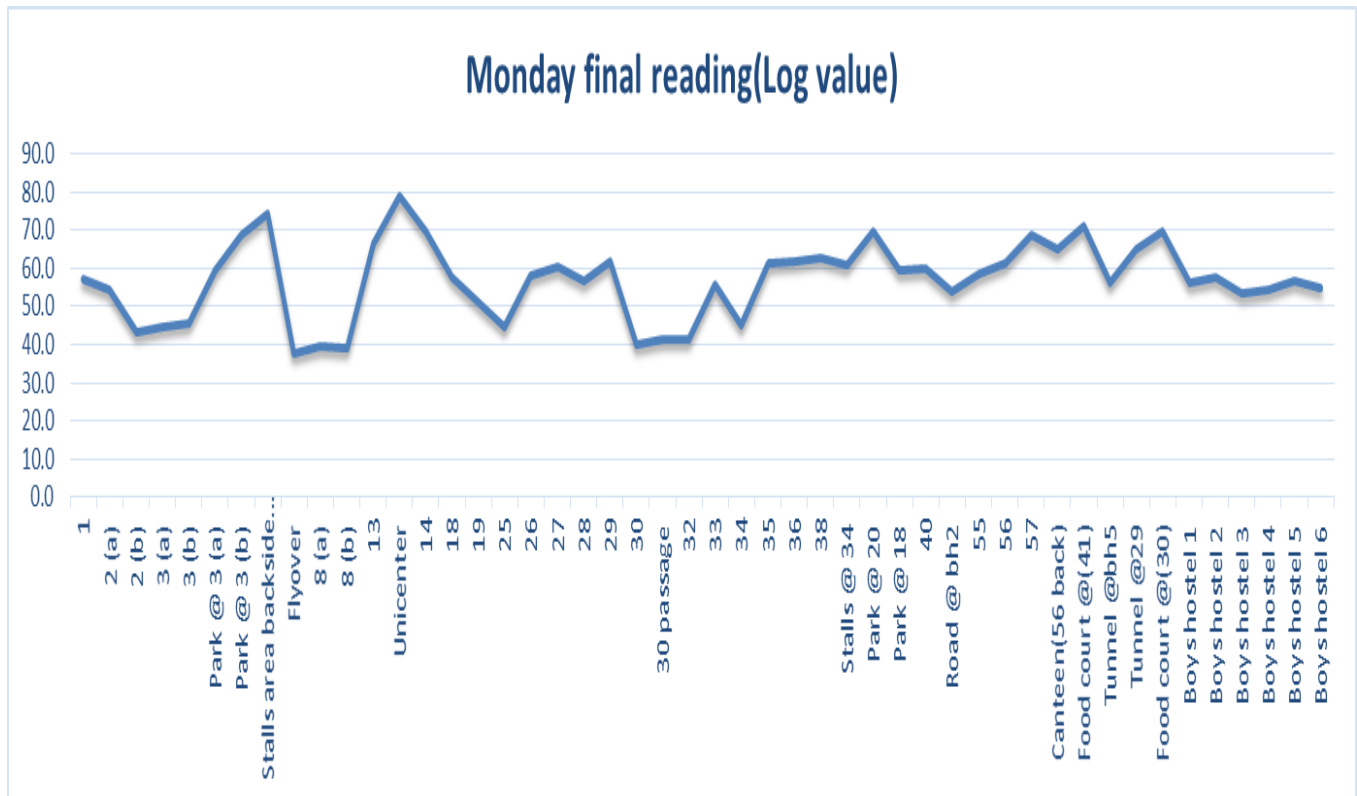
S. no	Block no/ area selected	Monday final reading(Log value)	Wednesday final reading(Log value)	Weighted mean reading of Friday	Morning final reading /10	Wednesday /10	Friday /10	Monday antilog value	Wednesday antilog value	Friday antilog value	Sum of readings	Sum/Total no of samples	Final reading(Log value)
1	1	57.0	55.5	56.4	5.7	5.5	5.6	495893.4	354445.8	434115.7	1284454.8	428152	56.3
2	2 (a)	54.3	51.0	56.1	5.4	5.1	5.6	270630.3	124532.8	403112.7	798275.9	266092	54.3
3	2 (b)	43.0	39.4	44.8	4.3	3.9	4.5	20041.8	8774.6	30132.0	58948.4	19649	42.9
4	3 (a)	44.4	42.0	46.3	4.4	4.2	4.6	27692.7	15741.1	42328.5	85762.2	28587	44.6
5	3 (b)	45.8	42.7	47.9	4.6	4.3	4.8	37636.8	18659.9	61125.3	117422.0	39141	45.9
6	Park @ 3 (a)	59.4	57.1	61.2	5.9	5.7	6.1	876764.6	515273.2	1325967.4	2718005.2	906002	59.6
7	Park @ 3 (b)	68.8	65.8	71.0	6.9	6.6	7.1	7650033.5	3779257.9	12481991.4	23911282.8	7970428	69.0
8	Stalls area backside CC	74.3	72.9	75.5	7.4	7.3	7.5	27182387.0	19440699.1	35286671.5	81909757.7	27303253	74.4
9	Flyover	37.5	35.1	39.2	3.8	3.5	3.9	5632.5	3212.0	8351.9	17196.4	5732	37.6
10	8 (a)	39.4	36.9	41.3	3.9	3.7	4.1	8782.9	4903.0	13435.3	27121.2	9040	39.6
11	8 (b)	39.3	37.1	39.7	3.9	3.7	4.0	8415.5	5116.9	9438.8	22971.1	7657	38.8
12	13	66.3	56.0	60.8	6.6	5.6	6.1	4239560.8	394875.1	1214821.4	5849257.2	1949752	62.9
13	Unicenter	79.0	77.9	76.1	7.9	7.8	7.6	79393640.9	61442967.4	40340397.0	181177005.3	60392335	77.8
14	14	69.9	66.0	72.3	7.0	6.6	7.2	9698488.0	3961713.3	16876356.4	30536557.6	10178853	70.1
15	18	57.4	54.7	59.1	5.7	5.5	5.9	551120.6	293738.2	816996.1	1661854.9	553952	57.4
16	19	51.1	49.4	50.7	5.1	4.9	5.1	129234.5	86997.3	116632.8	332864.6	110955	50.5
17	25	44.8	43.3	43.9	4.5	4.3	4.4	29915.8	21271.5	24297.2	75484.6	25162	44.0
18	26	58.1	55.3	59.9	5.8	5.5	6.0	645624.2	338657.3	967824.8	1952106.3	650702	58.1
19	27	60.2	57.4	62.1	6.0	5.7	6.2	1059227.9	551037.9	1604840.7	3215106.6	1071702	60.3
20	28	56.5	53.8	58.4	5.7	5.4	5.8	451852.1	242588.8	683924.8	1378365.7	459455	56.6

S. no	Block no/ area selected	Monday final reading(Log value)	Wednesday final reading(Log value)	Weighted mean reading of Friday	Morning final reading /10	Wednesday /10	Friday /10	Monday antilog value	Wednesday antilog value	Friday antilog value	Sum of readings	Sum/Total no of samples	Final reading(Log value)
21	29	61.6	68.7	66.8	6.2	6.9	6.7	1450941.2	7411454.4	4787087.0	13649482.7	4549828	66.6
22	30	39.9	36.8	41.8	4.0	3.7	4.2	9751.3	4771.8	14970.1	29493.3	9831	39.9
23	31	41.3	37.2	43.2	4.1	3.7	4.3	13458.8	5242.8	20984.2	39685.8	13229	41.2
24	32	41.6	38.4	43.9	4.2	3.8	4.4	14455.7	6931.7	24363.8	45751.2	15250	41.8
25	33	55.8	54.4	55.8	5.6	5.4	5.6	384317.7	275255.9	382625.0	1042198.7	347400	55.4
26	34	45.2	43.2	45.6	4.5	4.3	4.6	33160.6	21023.4	36622.6	90806.6	30269	44.8
27	35	61.2	58.1	61.6	6.1	5.8	6.2	1329178.6	652169.7	1441572.3	3422920.7	1140974	60.6
28	36	61.7	59.5	62.5	6.2	5.9	6.3	1470776.2	883168.1	1793664.1	4147608.4	1382536	61.4
29	38	62.5	59.8	64.1	6.2	6.0	6.4	1777382.0	957418.6	2574849.9	5309650.5	1769884	62.5
30	Stalls @ 34	60.7	58.8	60.9	6.1	5.9	6.1	1167703.0	751622.8	1243702.1	3163027.9	1054343	60.2
31	Park @ 20	69.5	71.1	73.3	6.9	7.1	7.3	8856775.3	12950483.6	21388218.0	43195476.8	14398492	71.6
32	Park @ 18	59.7	57.8	59.8	6.0	5.8	6.0	925999.1	602491.9	962743.7	2491234.7	830412	59.2
33	40	59.7	57.2	61.2	6.0	5.7	6.1	941224.5	521847.2	1322668.0	2785739.6	928580	59.7
34	Road @ bh2	54.1	51.4	56.3	5.4	5.1	5.6	256927.3	139482.8	422050.6	818460.6	272820	54.4
35	55	58.6	55.0	61.4	5.9	5.5	6.1	731483.3	315216.0	1366290.0	2412989.3	804330	59.1
36	56	61.5	58.4	62.8	6.1	5.8	6.3	1396577.7	685016.6	1926870.6	4008464.9	1336155	61.3
37	57	68.90418881	69.6	74.0	6.9	7.0	7.4	7769961.8	9031871.1	25142469.4	41944302.3	13981434	71.5
38	Canteen(56 back)	64.9775446	63.5	63.9	6.5	6.4	6.4	3145969.2	2259231.2	2465492.3	7870692.7	2623564	64.2
39	Food court @ (41)	71.10123465	68.9	72.3	7.1	6.9	7.2	12886158.4	7742359.8	16990953.5	37619471.7	12539824	71.0
40	Tunnel @bh5	56.01471034	54.3	70.1	5.6	5.4	7.0	399457.9	266904.5	10167869.7	10834232.1	3611411	65.6
41	Tunnel @29	65.22572201	65.2	65.1	6.5	6.5	6.5	3330981.3	3296576.3	3270231.8	9897789.4	3299263	65.2
42	Food court @ (30)	69.48921449	68.3	67.5	6.9	6.8	6.7	8890403.0	6764583.7	5564883.4	21219870.2	7073290	68.5
43	Boys hostel 1	56.21355925	58.4	63.1	5.6	5.8	6.3	418172.9	688589.1	2027170.6	3133932.6	1044644	60.2
44	Boys hostel 2	57.8148955	54.9	59.0	5.8	5.5	5.9	604629.8	306228.4	800675.6	1711533.7	570511	57.6
45	Boys hostel 3	53.66073506	50.9	55.4	5.4	5.1	5.5	232313.0	122455.3	348614.4	703382.7	234461	53.7
46	Boys hostel 4	54.1399391	50.7	56.1	5.4	5.1	5.6	259414.3	117295.2	410993.0	787702.5	262568	54.2
47	Boys hostel 5	56.54838209	53.5	58.4	5.7	5.4	5.8	451687.6	226359.3	694390.4	1372437.4	457479	56.6
48	Boys hostel 6	54.73392833	52.4	55.8	5.5	5.2	5.6	297435.5	174998.4	378501.7	850935.6	283645	54.5

CHAPTER 5

Data analysis and results

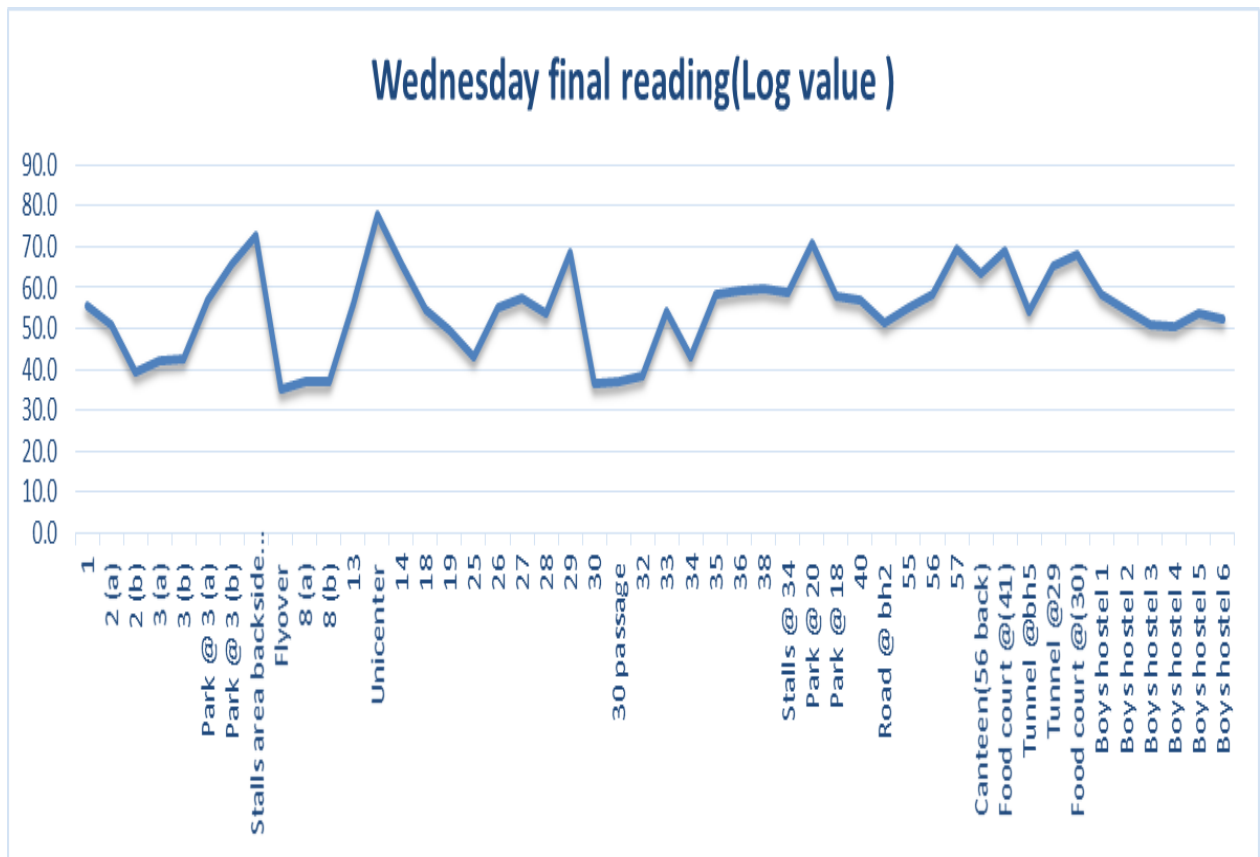
After collecting data and determination of logarithmic average value of noise for various stations. Graphs were plotted to highlight the stations where noise values were highest and lowest. The following were the graphs



Graph 1) Monday noise reading (Log value)

As per this graph the following results can be interpreted:

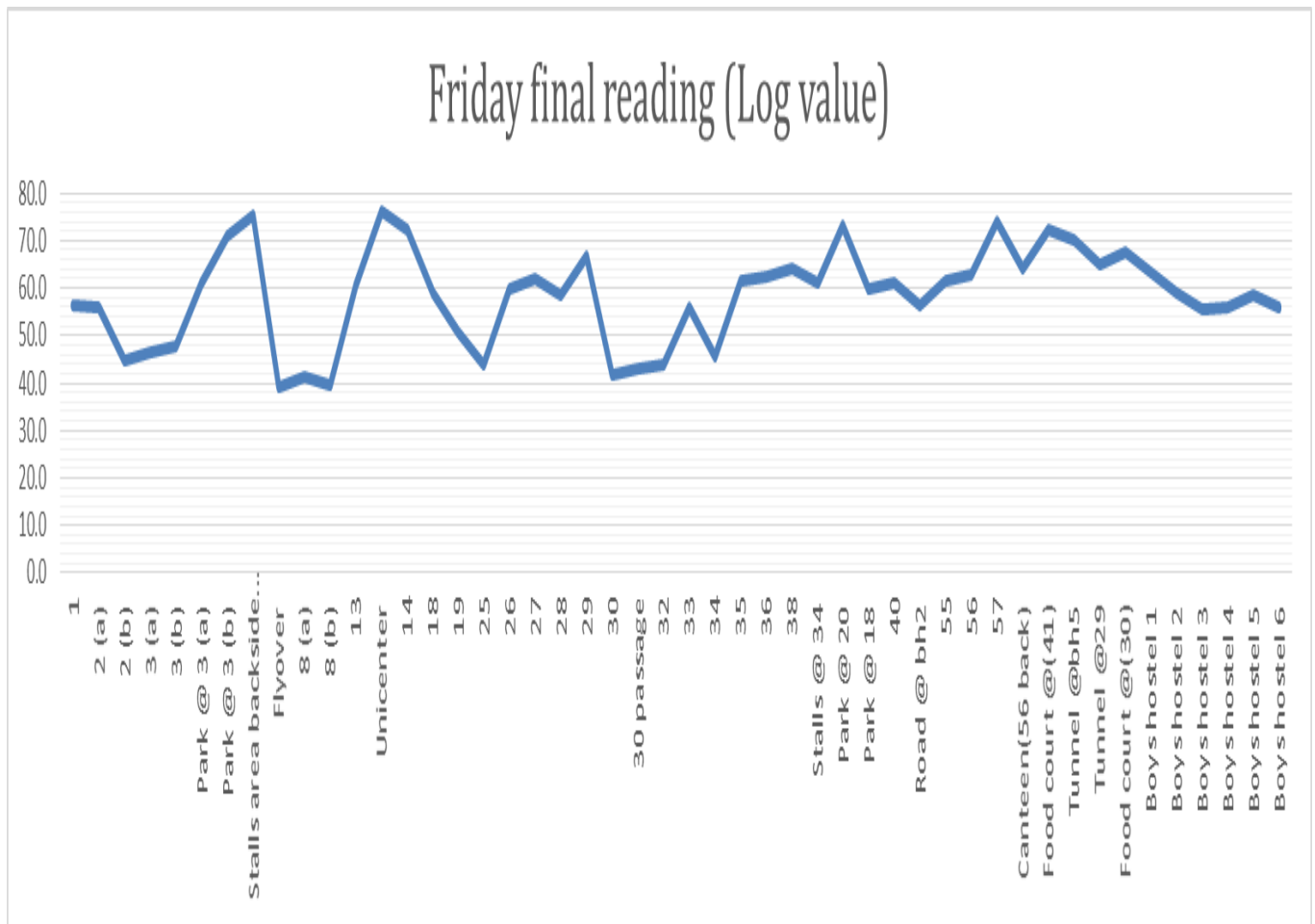
- Stalls area behind campus cafe, Uni-center and food court @41 block have highest noise levels greater than 70 dB with a peak noise level at uni-center
- Area under flyover, block 8 and block 30 were the areas where noise levels were lowest i.e. below 40 dB.
- Blocks 2, 3, 25, 32, 34 have average noise levels i.e. from 40 dB to 50 dB.
- Remaining blocks including hostels had noise levels from 50 dB to 60 dB.



Graph 2) Wednesday noise reading (Log value)

As per this graph the following results can be interpreted:

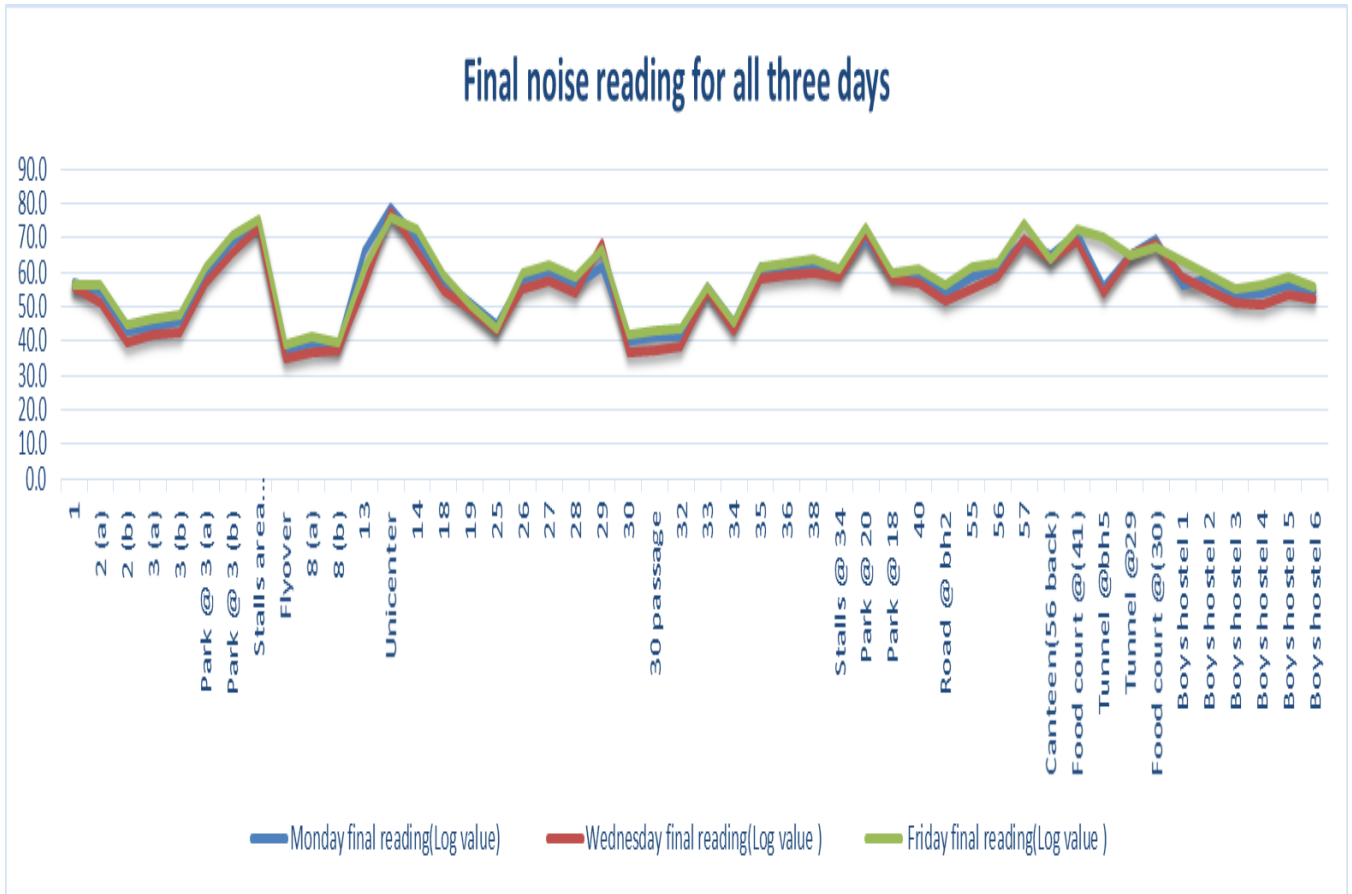
- Stalls area behind campus cafe , Uni-center and park@20 block have highest noise levels greater than 70 dB with a peak noise level at uni-center
- Area under flyover, block 2, 8, 30, 32 were the areas where noise levels were lowest i.e. below 40 dB.
- Blocks 3 ,19, 25,,34 have average noise levels i.e. from 40 dB to 50 dB.
- Remaining blocks including hostels had noise levels from 50 dB to 60 dB.



Graph 3) Friday noise reading (Log value)

As per this graph the following results can be interpreted:

- Stalls area behind campus cafe , Uni-center and park@20 block ,park @ 20 block ,food court@41 block and block 57 have highest noise levels greater than 70 dB with a peak noise level at uni-center
- Area under flyover and block 8 were the areas where noise levels were lowest i.e. below 40 dB.
- Blocks 2, 3 , 25, 30,32,34 have average noise levels i.e. from 40 dB to 50 dB.
- Remaining blocks including hostels had noise levels from 50 dB to 60 dB



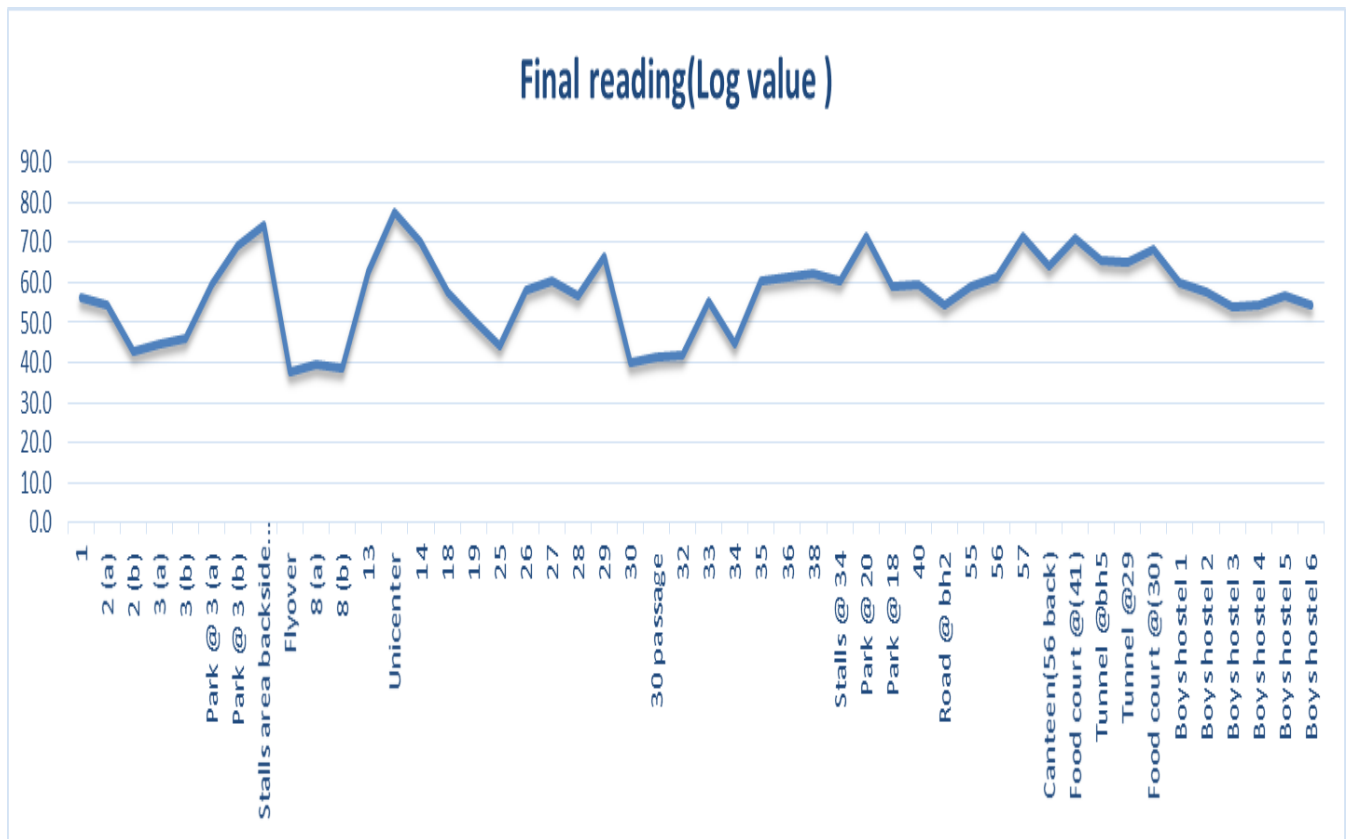
Graph 4) Final noise reading (Log value) of all three days

As per this graph the following results can be interpreted:

1 Among three days Noise levels are higher on Fridays for stalls behind Campus café, unicenter and park @ 20 block having noise levels greater than 70 dB.

2 Among three days noise levels on Wednesdays were a bit lower as compared to noise levels on Fridays and Monday.

3 Canteen @56 block backside and food court @41 block has high noise levels on Fridays as compared to Monday and wednesday



Graph 5) Final noise reading (Log value)

As per this graph the following results can be interpreted:

- Stalls area behind campus cafe , Uni-center and park@20 block ,park @ 20 block ,food court@41 block and block 57 have highest noise levels greater than 70 dB with a peak noise level at uni-center
- Area under flyover and block 8 were the areas where noise levels were lowest i.e. below 40 dB.
- Blocks 2, 3 , 25, 30,32,34 have average noise levels i.e. from 40 dB to 50 dB.
- Remaining blocks including hostels had noise levels from 50 dB to 60 dB

5.1 Results : After monitoring noise levels at all three stations and after proper analysis and from final logarithmic value ,following results can be extracted

1) Uni center was recorded to have highest noise level equal to 77 dB followed by stalls area backside campus café with 74 dB

2) Park @20 block, food court @41 block, block 57 and block 14 had sound intensities approximately equal to 71 dB.

3) Area underneath flyover was recorded to have lowest noise level equal to 37 dB .

4) Block 30 and block 8 (A) & (B) had noise level approximately equal to 39 dB.

5) Blocks 2 (A) & (B),3 (A) & (B), 25, 32, 33, 34 along with boys hostel 3,4 and 6 recorded noise levels in between 40 dB to 55 dB .

6) Noise values varied from 39 dB to 76 dB and on dividing these entire limits into four ranges from lowest range from zone 1 (30 dB to 40 dB) to zone 5 (70 dB to 80 dB) with a interval of 10 dB ,the number of stations following in these ranges are given below

Noise range	No of stations falling in same range	zone
30 dB -40 dB	4	zone 1
40 dB -50dB	7	zone 2
50 db- 60 dB	17	zone 3
60 dB -70 dB	14	zone 4
70 dB-80 dB	6	zone 5

Table 9) Noise zones across campus

7) These noise zones across campus clearly indicate following results on plotting it on pie chart .

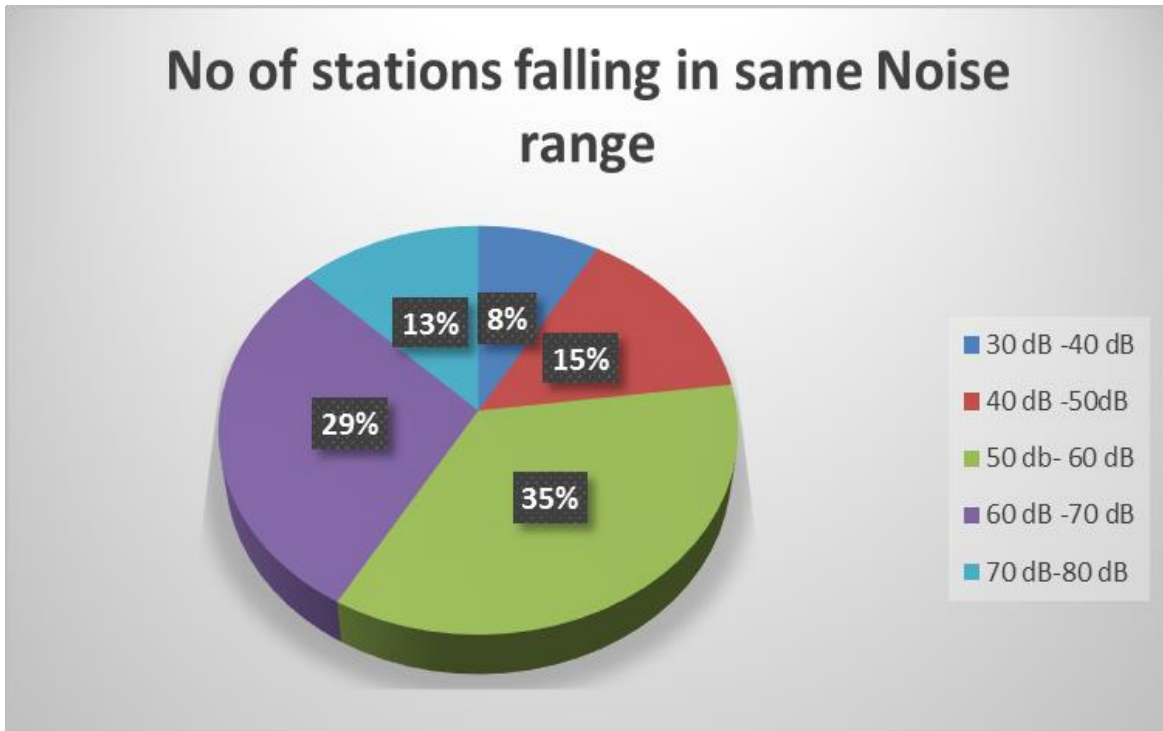


Figure 7.1 Noise range chart

As per these results it is clearly evident that 13% of total selected stations ie 6 stations have alarming noise levels were control is to be required followed by 29 % ie 16 stations were noise levels are greater than 60 dB and were noise levels can be bought under control easily .In terms of low noise production 8% (4 stations) and 15 % (7 stations) fall under safe noise production values.

CHAPTER 6

Conclusions and Recommendations

6.1 Conclusions Noise levels measured at different stations in campus of lovely professional university were compared with permissible limits. Results of analysis was used to highlight those areas where noise levels were of appreciable concern . From analysis of data presented in preceding sections following conclusions can be drawn .

1) Uni center was recorded to have highest noise level equal to 77 dB followed by stalls area backside campus café with 74 dB. This was basically due to the reason that majority of students prefer to go these places whenever they are free .Also both these place offer recreational and eating facilities apart from providing ATM facilities also due to which number of visitors or users at this place is high

2) Park @20 block, food court @41 block, block 57 and block 14 had sound intensities approximately equal to 71 dB. This was basically due to the reason that number of students in 14 and 57 blocks is quite appreciable and assembly of students is quite more.

3) In commercial areas of University campus comprising of food courts, stalls area, uni center noise levels were quite high as compared to ambient national standard of 65 dB, requiring specific abatement measures.

4) Noise levels in silent zone ie hospital area ie block 3 was found to be quite low as compared to ambient national standard of 50 dB

5) Higher noise levels were found in zone 3 and zone 4 comprising of 17 and 14 stations respectively were certain measures can be adopted for decrease in noise levels.

6) Comparative study between noise levels day wise indicates that noise production is high on Monday and Fridays as majority of students visit campus on both the days.

7) Comparative study between noise levels day wise indicated that noise production on Wednesday is a bit lower as compared Monday and Friday as number of students visiting campus on this day decreases as compared to initial and ending days of weeks.

8) In open assembly areas like stall areas and parks noise levels automatically increased as assembly of students was more in such places.

9) Unicenter has recorded highest noise levels because of the reason that this place is located in the heart of university ie at central place adjacent to campus road thereby by making it easier for persons to visit this place easily .

6.2 Recommendations Based on the preceding analysis and results following recommendations and preventive measures emerge which may prove to be useful for carrying out further research work in this area.

1) Continuous monitoring of noise levels for day and night over 24 hours period should be done for entire university campus to determine more precise results .

2) Noise measurement can also be done by using sound level meter android phone applications and it can be compared with the values obtained using normal sound level meters to determine the variation and to compare the results.

3) All blocks in campus can be improved in terms of its acoustical features, wooden panels were ever required , main doors of blocks can be properly modified to absorb or divert sound production .

4) Use of Sound masking technique ie the addition of natural sound (such as a water fountain) or artificial sound into an environment to cover up unwanted noises can reduce or eliminate the awareness of pre-existing sounds in a given space thereby it can prove to be helpful in eliminating effects of noise .

5) Use of proper sound absorbers which can prevent sound transmission by forming a solid, impervious barrier basically sound absorbers are generally porous, lightweight material commonly formed of matted or spun fibers; panel (membrane) absorbers having an impervious surface mounted over an airspace; and resonators created by holes or slots connected to an enclosed volume of trapped air.

6) This measured noise intensities station wise can be mapped on software's like GIS so that proper representation on data can be done in very informative manner

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