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CONTENT OF
GENERAL EDUCATION IN RELATION TO
OCCUPATIONAL TRAINING
IN PAKISTAN

BY

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ANNEXURES

P R E F A C E

In the context of National Studies on General Education in Relation to Occupational Training, the UNESCO Regional Office Bangkok invited the Ministry of Education to undertake the country study. The Ministry of Education assigned the subject study to the Academy.

In the completion of this study, cooperation has been sought from numerous agencies like Curriculum Wing of the Ministry of Education; National Training Bureau of the Ministry of Labour, Manpower and Overseas Pakistanis; Development Cell of Manpower and Training Department of the Government of Punjab, Lahore; Central Bureau of the Ministry of Education; Principals of Technical Training Centres Peshawar, Gulberg and Moghulpura. In addition a number of individuals were interviewed and consulted. The names of individuals who have extended cooperation by providing pertinent information have been listed in the annexure to the study. I sincerely offer my gratitude to all the organizations and individuals who have extended cooperation in the production of this collective document.

My gratitude is also due to my colleague Dr. Abdul Ghafoor who took pains in collection of pertinent

information; undertook the tedious task of interviewing numerious officials of both Federal and Provincial Governments; and gave shape to this Report. His extra-ordinary efforts in the compilation of this report are highly appreciated. We are grateful to the UNESCO Regional Office Bangkok who provided the impetus as well as the resources to undertake this study.

(A. G. MUFTI)
Director General

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1. INTRODUCTION

This study has been undertaken by the Academy of Educational Planning and Management on behalf of UNESCO Regional Office Bangkok which provided financial support. The following terms of reference were indicated by UNESCO which have defined the scope of the study:

1. four to five occupational training and retraining schemes which require the completion of primary or lower secondary education as entry qualification (at least two requiring primary stage completion and 2 lower secondary stage completion);

2. based on discussions about the performance of students of the training and retraining schemes, draw up a list of competencies, behaviour patterns and values which are important determinants of success or failure and level of achievement at the training and retraining courses;

3. critical review of current curriculum of primary and lower secondary stages of general schools in relation to the training schemes for which these stages are entry qualifications;

4. recommendations for improving policies, objectives and contents of the curriculum for primary and lower secondary education.

1.2. The study is based on the government documents, especially the reports of the Curriculum Wing of the Ministry of Education prepared from time to time; National Training Bureau of the Ministry of Labour, Manpower & Overseas Pakistanis which provided the curriculum developed for various trades; Manpower & Training Development Cell of the Government of Punjab and the Technical Training Centres Gulberg

and Moghulpura which provided the details of tradewise enrolments and training policies. The documentary review was further supplemented by in-depth interviews with the Principals, faculty, and students of Technical Training Centres Peshawar, Gulberg, and Moghulpura.

1.3. In order to provide proper persepctive to the readers and facilitate their understanding of the technical/vocational training system in Pakistan, the study has been divided into following sections/chapters:

1. Aims and Objectives of Education.
2. The Content of Education.
3. Scheme of Studies (Primary & Junior Secondary)
4. Rationale of Important Subjects.
5. System of Technical and Vocational Education.
6. Occupational Training.
7. Relevance of General Education Curriculum in Relation to Occupational Training.
8. Conclusions and Recommendations.

1.4. Instead of overloading the text of the study, an attempt has been made to provide the relevant extracts of the curriculum for various subjects like Urdu, Maths, Science, and social studies in the annexures. Similarly, the curriculum for various trades requiring primary or junior secondary qualification have also been put in the annexures. The list of persons interviewed or contacted has also been given in the annexrures.

2. AIMS AND OBJECTIVES OF EDUCATION

What is the purpose of education? What does it aim to achieve? Every educator has seriously considered these questions at some stage or other. The aims of education are determined by national, political, social, economic, psychological and pedagogical needs. Many of the fundamental concerns of education have persisted through out the centuries, but in the course of time, different aspects have been stressed for example,

(a) Educational aims were for a long time of an essentially ethical, social, patriotic and ideological nature which emphasized the function of education as a preserver and transmitter of the cultural heritage.

(b) Later, emphasis was laid on intellectual training (primarily literacy, latterly scientific). Knowledge became an end in itself.

(c) A common idea now-a-days is to link education to national development, so that training may be a preparation for employment for life in its broad economic aspects, for cooperation in common endeavours, and participation in the practices of democracy.

(d) Education is increasingly being looked upon as a

means of changing, renewing and even of challenging the established values. The emphasis is on educability and trainability rather than on instruction as such.

2.2. In text-books as well as in government policy statements one finds elaborate lists of educational objectives formulated in different ways. They vary in both content and emphasis. Three main aims of education are, however, embodied in every list in one form or another. They are:

(a) the mental, emotional, spiritual and physical development of the individual and his adjustment to society;

(b) the economic viability of the individual; and

(c) the maintenance of the cultural identity of the society to which the individual belongs

2.3. The aims of education as spelled out in the National Education Policy of 1979 are reproduced below:

i) To foster in the hearts and minds of the people of Pakistan in general and the students in particular a deep and abiding loyalty to Islam and Pakistan

and a living consciousness of their spiritual and ideological identity thereby strengthening unity of the outlook of the people of Pakistan on the basis of justice and fairplay.

ii) To create awareness in every student that he, as member of Pakistani nation is also a part of the universal Muslim Ummah and that it is expected of him to make a contribution towards the welfare of fellow Muslims inhabiting the globe on the one hand and to help spread the message of Islam throughout the world on the other.

iii) To produce citizens who are fully conversent with the Pakistan movement, its ideological foundations, history and culture so that they feel proud of their heritage and display firm faith in the future of the country as an Islamic State.

iv) To develop and inculcate in accordance with the Quran and Sunnah, the character, conduct and motivation expected of a true Muslim.

v) To provide and ensure equal educational opportunities to all citizens of Pakistan and to provide minorities with adequate facilities for

their cultural and religious development enabling them to effectively participate in overall national effort.

vi) To impart quality education and to develop fully according to their capacity, each individual's potentialities, through training and retraining and to develop the creative and innovative faculties of the people with a view to building their capability to effectively manage social; natural and productive forces, consistent with the value system of Islam.

vii) To provide a minimum acceptable level of functional literacy and fundamental education to all citizens of the country particularly the young, irrespective of their faith, caste and creed in order to enable them to participate productively in the total national effort.

viii) To create interest and love for learning and discipline among the youth and to ensure that every student is imbued with the realization that education is a continuous and a life-long process.

ix) To promote and strengthen scientific, vocational and technological education, training and research

in the country and to use this knowledge for socioeconomic growth and development thereby ensuring a self reliant and secure future for the nation.

2.4. The aims and objectives of education have been spelled out in the global context which provide proper perspective for appreciating the aims and objectives of education enumerated in the National Education Policy of Pakistan 1979. It has been observed that there is an overall tendency of linking education to national development so that training may be a preparation for employment for life in its broad economic aspects for cooperation in common endeavours. Efforts are made to increase the economic viability of the individual through education and training. Expenditures on education and training, therefore, are treated as investment in the human resource development which ultimately contributes to the format ion of human capital.

2.5. From the perusal of the list of aims and objectives of education in Pakistan, it will be observed that more emphasis has been laid on the ideological foundations of the State which are deeply entrenched in the value system of

Islam. According to the Policy, the character and conduct of the individuals has to be developed in accordance with the Quran (The Divine Book) and the Sunnah (The sayings of the Holy Prophet Mohammad). Side by side with ideological orientation and the development of character, the policy lays stress on the promotion of scientific, vocational and technological education, training and research.

3. THE CONTENT OF EDUCATION

By content of education we used to mean the quantum of knowledge which the school or educational institutions transmitted to a pupil. That was when the school functioned like a shop, the teachers like salesmen;and education was a commodity. Over the last few decades, this concept of the content of education has undergone a considerable change.

3.2. What we call the curriculum now encompassess the whole range of the learning experiences that a student undergoes. "It is conceived as the whole of the interacting forces of the total environment for pupils in the school and the pupils' experiences in that environment." Here, again we may begin by noting that our concept of curriculum has to be wider because we are no longer confined to a school or an institution as the only environment where a person has learning experiences.

3.3. It is further important to note that, with

our extended objectives of education, our concern is not with knowledge only. Knowledge or what educators call the Cognitive Domain is no doubt an important aspect of learning and in all our efforts it will continue to receive much attention. But a significant change in our outlook on knowledge is to be noted. Knowledge is no longer considered a precious possession to be gathered and stored in our mind for its own intrinsic value. It has to be an aid to cognition and thinking. It is to be the raw material through which our search for new ides and new interpretations of things is promoted. As important as the knowledge is the emotional experiences which our search for new ideas and new iterpretations of things is promoted. As important as the knowledge is the emotional experiences which are reflected in our attitudes. Attitudes and feelings, which constitute what is called the Affective Domain, are as much dependent on the content of education as knowledge is. So are the manual or practical skills falling within the Psychomotor Domain.

3.4. The curriculum, which aims at identified or identifiable objectives in the above three domains at various levels according to both individual or social needs, consists of two main elements:

a) A core curriculum, which consists of experiences which a country considers to be essential for every

citizen to perform his obligations as a citizen and

b) electives or optionals which consist of such knowledge and skills as may be needed for certain individual needs and wishes or social needs.

3.5. Certain far reaching changes have taken place in recent years, in the manner in which the learning experiences constituting each of the above elements are identified and developed. This process, which is called curriculum development (sometimes referred or called curriculum renewal or curriculum planning) is influenced by the scientific and technological changes taking place within a particular social setting or environment. The Education Policies promulgated by the Government from time to time in Pakistan have stressed that curriculum development should remain a continuous process rather than a sporadic or one time effort. Consequently, various curriculum reforms were introduced which laid emphasis on learning of concepts and skills, encouraged observations, exploration, experimentation, practical work and creative expressions.

3.6. In view of the fact that curriculum development is a continuing process and standards of education have to be maintained at certain level, the subject of curriculum has been brought under the concurrent list of the Constitution. Necessary infrastructure has been provided both at National as well as Provincial level. At the National level, a Curriculum Wing has been created which is functioning as an integral part of the Ministry of Education. Each province has a Curriculum Research and Development Centre or Curriculum Bureau which is functioning under the administrative control of the Provincial Education Department. The aims and objectives of education spelled out in various education policies are vigorously persued by the Curriculum Wing of the Ministry of Education in consultation and active participation of the Provincial Curriculum Bureaus.

4. SCHEME OF STUDIES

In the earlier section we have discussed the infrastructural arrangement and the institutions responsible for the development of curriculum for various levels of education. In this section we have to provide perspective with regard to the nature of subjects taught both at the primary and junior secondary (middle) level. For the convenience of the readers, scheme of studies for primary classes I-V has been given in Table 1 on next page. It will be observed that the scheme of studies includes 8 subjects taught at the primary level. Those are: First and Second language, Mathematics, Science, Pakistan/Social Studies, Health and Physical Education, Islamiyat, Arts, Tree Plantation/Manual Work. The time reserved for each subject can be seen in the Table. It will be observed that in the first two classes, stress is laid on the first language for which 12 periods stretching over eight hours have been provided. The percentage time reserved for the first language is 30.8% for the First and Second class children; whereas no provision has been made for the second language. This means that the learning

Table -I

REVISED

SCHEME OF STUDIES FOR PRIMARY CLASSES (I–V)

	Subjects	CLASS I and II. Age 5 and 6 +			CLASS III Age 7 +			CLASS IV and V. Age 8 + 9		
		No. of periods per week (39)	No. of Hours per week (26)	Percentage of total time	No. of periods per week (39)	No. of Hours per week (26) Each period of 40 minutes	Percentage of total time	No. of Periods per week (40)	No. of Hours per week (26–40) Each period of 40 minutes	Percentage of total time
1.	Languages :									
	(a) 1st language	12	8	30.8	6	4	15.4	6	4	15.0
	(b) 2nd language	–	–	–	6	4	15.4	6	4	15.0
2.	Mathematics	6	4	15.4	6	4	15.4	6	4	15.0
3.	Science	5	3.20	12.8	6	4	15.4	5	3.20	12.5
4.	Pak; Social Studies	4	2.40	10.2	3	2	7.7	4	2.40	10.0
5.	Health and Physical Education	–	–	–	2	1.20	5.2	3	2	7.5
6.	Islamiyat	6	4	15.4	6	4	15.4	6	4	15.0
7.	Arts	5	3.20	12.8	3	2	7.7	3	2	7.5
8.	Tree Plantation/Manual Work	1	0.40	2.6	1	0.40	2.6	1	0.40	2.5

Explanatory Notes on the allocation of time.–(1) In the week the school will function for five full days and one half day in the following manner :

(a) for 4 Hours and 40 minutes divided into 7 periods on full working days and 2 Hours 40 minutes divided into 4 periods on half working days.

(b) the working hours exclude time for daily assembly (10 minutes), Recess (30 Minutes) and ten minutes short-break on full working days and one shortbreak of 10 minutes only on half working days.

skill of the child is developed in the first language especially in those areas where more emphasis is given to mother tongue of the child. Normally, the children are taught in Urdu which is the National language of Pakistan and is the medium of instruction from primary to secondary level.

4.2. Right from First to Fifth Class, due stress is laid on Mathematics. Four hours per week instructions have been made essential for all the five classes. Thus the total time reserved for this subject is about 15%. Besides Mathematics, Islamiyat has also been provided same amount of time so that the children are taught Islamic values and the way of life (Pakistan is predominantly a Muslim country where the State religion is Islam. However, due recognition has been given to the Minorities for whom the subject of ethics has been introduced). Four hours per week have been reserved for Science and Arts which means that 12.8% of the time has been reserved for each of these subjects. Pakistan/Social Studies is taught from Class I to V; whereas time is provided for Health and Physical Education from Class III onward. About 2-3% of the

time has been reserved for activities like tree plantation or manual work.

4.3. From the perusal of the list of subjects in the scheme of studies one gets the impression that all these subjects are taught or practiced. But in actual practice certain subjects are not given sufficient time. The subjects of Health and Physical Education; Tree Plantation/Manual Work are such for which no examination is administered to the students. Therefore it entirely depends on the discretion of the primary school teacher and the availability of facilities for such subjects. There may be single-teacher schools where the teacher may be so overburdened that he may hardly find time to get the required exercises from the students. On the other hand, there may be schools where adequate physical facilities may not be available. According to the National School Mapping Survey conducted by the Ministry of Education in 1984, 14,370 Government schools at all levels were surveyed. The position in respect of the ownership of the school buildings is given in the following Table:

Owner of school building	Number of schools
a) Provincial Government.	6,377
b) Federal Government	348
c) Semi Government	793
d) Private	6,852

The private buildings in which the schools are functioning, are either houses rented out by their respective landlords: or provided by the communities free of charge. The same Survey has also reported about the conditions of their buildings which is reproduced below:

Condition of the building.	Number of schools.	Percentage
a. Excellent.	1,064	6.8
b. Good.	3,623	23.0
c. Satisfactory	5,481	34.8
d. Poor	999	6.3
e. Needs major repair	2,349	14.9
f. Needs total replacement.	1,270	8.0
g. No buildings	953	6.1

Though the conditions have considerably improved but still there is lot to be done for the improvement of primary education both quantitatively as well as qualitatively. Besides the depressing state of affair in terms of physical facilities, there could either be shortage of teachers or inadequately trained teachers or poorly equipped supervisory personnel. Strictly speaking, the element of supervision is rather non-existent as compared to the element of inspection. The Inspector of Schools normally administer tests to the students in the primary schools for promotion to the next grade. Usually, the students are asked questions in the subjects of Mathematics, Science, Social Studies, etc. So for all practical purposes, the students are taught only six subjects in the primary classes. The aims and objectives as well as curriculum content of some of the important subjects will be provided at an appropriate place in the following sections of this presentation.

4.4. The list of subjects taught at the primary level is further extended to include certain additional subjects like English, Agro-Technical education, etc. at the junior secondary level which comprises classes VI-VIII. In fact Agro

technical education has been introduced in classes VI to VIII in certain selected schools in the country. The number of periods per week; the number of hours each subject has to be studied during a week; and the percentage of total time reserved for each subject can be seen in Table II. It will be observed that 13.33 % of the time is consumed by the First Language; 8.88 % by the second language; and 13.33 % by compulsory English. This means that 35.54 % of the time is consumed by languages. Not only this, but in fact 6.66 % of the time reserved for Arts/Arabic/Persian falls under the same category. This is a clear indication as to how much stress has been laid on the learning of languages at the junior secondary level.

4.5. Next to languages is the subject of Agro-Technical Education for which 17.77 % of the time has been reserved in the scheme of studies. This scheme was introduced at the secondary level in persuance of the 1972-80 Education Policy which suggested integration of Agro-Technical with General Education because of the following reasons:

Table - II

REVISED
SCHEME OF STUDIES FOR MIDDLE CLASSES (FROM CLASS VI TO VIII)

	Subjects	Classes VI to VIII Age 9 to 10 x & 11 x		
		No. of periods per week (45)	No. of Hours per week 00 Each period of 40 minutes	Percentage of total time
1.	Languages :			
	(a) 1st language	6	4	13.33
	(b) 2nd language	4	2.40	8.88
	(c) English Compulsory	6	4	13.33
2.	Mathematics	4	2.20	8.88
3.	Science	3	2.00	6.66
4.	Pak/Social Studies	3	2.00	6.66
5.	Health and Physical Education	3	2.00	6.66
6.	Islamiyat	4	2.40	8.88
7.	Arts/Arabic/Persian	3	2.00	6.66
8*.	Agro-technical	8	5.20	17.77
9.	Tree Plantation/Manual work	1	0.40	2.22

Explanatory Note on the allocation of time.–In the week the School will function for five full days and one half day as mentioned below :-

(a) For 5 hours and 20 minutes divided into 8 periods on full working days and 3 Hours and 20 minutes divided into 5 periods on half working days.

(b) The working hours exclude time for daily assembly (10 minutes and recess 30 minutes) on full working days and one short break of 15 minutes only on half working days.

(c) A province may have the choice to utilize the time allocated for provincial language otherwise.

*(d) In the schools where Agro-technical subjects or other substitute activities perojects are not being introduced this year, periods assigned for Agro-technical in class VI may be re-allocated proportionately to the other subjects protem.

> In the past the general tendency has been to establish separate institutions for technical education. These institutions have not always produced efficient industrial workers. The education given in them has lacked the necessary cultural content and in practice they catered for the rejects of the general stream and a certain stigma was attached to their programme. The new programme will provide for progressive integration of general and technical education. (See the Author's Innovative Experiences in the Optimal Use of Financial Resources for Education in Pakistan a Study conducted for UNESCO Bangkok, July, 1985, p.55).

4.6. From the Schere of Studies at the Junior Secondary level, it will be observed that Mathematics and Science which are the most important subjects in the contemporary situation and are being given importance at the higher levels, have been given lesser time. For instance at the elementary stage (primary), these subjects were given 15% and 12% of the time. This has been brought down to 9% and 7% respectively at the secondary level. Pakistan/Social Studies time has also been reduced from 1[illegible] to 7%. The cumulative time for Physical and Social Sciences is about 22%. We are not in a position to provide the curriculum content, aims and objectives of each subjects at the secondary level. However, attempts will be made at an appropriate place to provide some perspective about the most important subjects like Mathematics, Science, Social Studies, etc.

5. RATIONALE OF IMPORTANT SUBJECTS

Languages

In the scheme of studies mentioned earlier, the subject of languages has been provided. During the primary stage, the students are exposed to first language i.e. the mother tongue; and a second language which in most of the cases is Urdu , i.e. the National Language. The major regional languages in Pakistan are Punjabi, Sindhi, Pushtu, and Baluchi. There are variations in these languages and have dialects which are spoken in various parts of the same region. Keeping in view these variations in dialects, it has not so far been possible to fully develop or design instructions in the first language of the child. For instance in N.W.F.P. Pushtu is considered as the dominant regional language but the spoken Pushtu of the Tribal Areas is different from those of the Settled Areas. Even in the settled areas, the spoken pushtu of Bannu may be different from that of Mardan and Peshawar. Similar variations exist in Punjab and elsewhere which makes the job of curriculum developer quite complex. In view of the complexities, the normal practice is that stress is laid on teaching of urdu which is the national language and medium of instruction upto secondary level. There are

other minor languages like Kohistani and Chitrali in NWFP; Saraeki in Punjab but no written material is available for the students. The students in these areas are taught urdu instead of the mother tongue.

5.2. From the scheme of studies it may have been observed that the first language is taught to the students of Class I & II for eight hours during a week. In the absence of proper instructional material and textbooks, the first language, as mentioned earlier, may not be taught in the schools where the children do not speak an established language. So the time reserved for Ist language in the scheme of studies could be taken up by second language. Similar adjustment of timings are made in the subsequent classes. In view of the fact that urdu is taught as the National Language which eventually becomes the medium of instruction, it will be desirable to list the aims and objectives of urdu teaching as spelled out by the curriculum experts. This can be seen in Annex. I.

Mathematics

5.3. In the scheme of studies four instructional hours per week have been reserved for Mathematics teaching to the students of class I-V. This subject is taught

regularly in accordance with the reserved time. Most of the texts are in urdue but it also depends on the ingenuity of the local teacher as how effcectively he/she can impart instructions and making the children understand the basics of mathematics in the local spoken language.

5.4. At the primary level the students are provided with certain basic concepts of real numbers, algebric operations, measurement, geometry, graphs, roman numbers, money, etc. These concepts are provided so as to satisfy the mathematical needs and interests of the child; develop a disciplined mind and exercise sound judgement in relation to the events of every day life; provide the basic ground work for the understanding of scientific reasoning and calculation; create farourable attitudes towards and interest in Mathematics showing the contribution it has made and is making to our present civilization and culture.

5.5. At the junior secondary level, i.e. from class VI-VIII, the course content focuses on Algebraic operations, Ratio and Proprotion, Averages, Algebra, Geometry, Graph, Sets, Real Numbers. It is not possible to provide the classwise curriculum content here. However, such details

can be seen in Annex-II, which provides the details of aims and objectives of Teaching Mathematics , the classwise curriculum content. These details have been provided to allow international comparisons.

5.6. From Annex II, it will be observed that the curriculum has been under constant review of the Government of Pakistan. There has been a review in 1975 and a subsequent review was undertaken in 1984. Curriculum content proposed by these reviews have been provided in the same Annex.

5.7. The course content at junior secondary level enables the child to acquire elementary knowledge of numbers and appropriate skills of quantity; develop skills in the application of numbers and other mathematical structures; solve mathematical problems having a practical value in future life situations; to construct and interpret graphs and to present quantitative data in a tabular form and to use simple statistical techniques.

Science

5.8. The teaching of science has been provided 3-4 hours a week in the scheme of studies for the primary

classes and 3 hours for the classes at the junior secondary level is taught as an integrated course reflecting the essential unity of science as a whole. The general as well as specific aims of teaching science both at primary as well as junior secondary level alongwith classwise curriculum content have been given in Annex III. Most of the aims/objectives of teaching science falls under the cognitive domain of knowledge; whereas there is little provision for the psychomoter or affective domains.

Social Studies

5.9. The philosophy, rationale, and the content of curriculum in terms of various domains of knowledge can be seen in Annex IV. From the scheme of studies it may be observed that 2.40 hours time has been earmarked for this subject for class I & II students; 2 hours for class III students; and 2.40 hours per week for class IV & V students. As far as the junior secondary level is concerned, the time is 2 hours per week. This subject imparts education for citizenship like self realization, economic efficiency, human relationship and civic responsibility.

6. SYSTEM OF TECHNICAL AND VOCATIONAL EDUCATION

Since Independence, Pakistan has progressively built up an infrastructure for technical/vocational education and training which is pre-dominantly school based. The present net work comprises institutions such as Polytechnics/Colleges of Technology, Commercial Training Institutes/Colleges, Vocational Training Institutes, Technical Training Centres, Agro-technical Schools offering technical streams at the middle and high school stages. Although successive Five Years Plans and various education policies have been foreseeing the increasing involvement of the industry and employers in the training of technical manpower of requisite skills and competencies, unfortunately it has not been possible to make any significant break-through in this direction. Further, various programmes had to be initiated after Independence to produce rapidly a substantial number of trained, skilled workers and technicians in a relatively short period of time to meet the critical skill shortages confronted in mounting large scale development effort. Accordingly, no ready alternatives existed except to set up a number of specialized institutions, basically forming an integral part of the governmental set-up.

6.2. The present system is comprised of 40 craftsmen-level institutes known as Government Vocational Institutes/Technical Training Centres for Boys, 95 Vocational Institutes for Girls, 69 Commercial Institutes/Colleges of Commerce, and 34 Polytechnic Institutes/Colleges of Technology (including 5 for women) In addition, existing facilities have been utilized by organizations such as Overseas Pakistanis Foundation, wah ordinance factory, Ministry of Labour (Crash Programmes) and others for training of craftsmen-level persons suited to their needs.

6.3. It may be useful to recognize the following distinct organizational stages, below professional level:

Mid-Professional (Diploma) Level: This level is equivalent to the upper secondary stage where Diploma level technical/vocational education is administered in institutions such as Polytechnics, Colleges/Institutes of Technology, etc., offering post-matric 3 years courses in various technologies. The out-put from these institutions is expected to fill positions of supervisory capacity in industrial establishments technical services etc. Additionally, Commercial Institutes, also fall in this category which offer post-matric Diploma Courses in commercial subjects such as accountancy, secretarial practices, book keeping, etc.

Craftsmen Level: This concerns the training needs of skilled workers at the level of operators (carpenters, masons, machinists, welders, electricians, etc.) A variety of institutions offering post-middle and post-matric courses under different ministries/ provincial departments are operating with courses of varying contents, durations and objectives. Quite a few vocational schools offer courses for girls.

Pre-Vocational Level: This level may be construed to encompass all such courses which have been introduced below matric level in various institutions with a view to aquainting the students with elementary production oriented training as an integral component of general studies such as Agro-technical courses introduced in middle and high schools of Pakistan.

MID-PROFESSIONAL LEVEL

6.4. The situation has remained somewhat confused about the role and purpose of middle-level semi-professional technical manpower which was to serve as a link between skilled worker on the one hand and professional engineer or technologist on the other. At the time of independence, Pakistan inherited no institution comparable to the present day polytechnics for the production of middle-level technicians. When gradually both the engineering and the technological

manpower at more or less the same professional level in the job market albeit with different emphasis of work.

COMMERCIAL EDUCATION

6.5. The industrialization effort in any country has to bank upon the simultaneous development of the commerce sector. The production of manpower in commerce has been rapidly expanding in Pakistan and Commercial Institutes/ Colleges of Commerce have been set up. At present commercial institutions are offering post-matric 1-2 years' training programmes in the allied fields of secretarial practices, commerce, banking, and insurance. The Degree programmes in commercial field are offered at 12 institutes which now stand converted to colleges. The existing structure of the programme has however, hindered the development of distince of Commercial Instiuttutes to move into the degree-stream of commerce education. While recognizing the importance of sub-professional commerce education, it is essential that its relevance with reference to the identified jobs should be improved.

CRAFTSMEN LEVEL

6.6. The vocational centres/institutes, meant to produce skilled workers present a wide variety, in terms of structure

of programmes, emphasis on skill development, duration of programmes, methods of trainino and jurisdictions, pattersns of administration and financing. Although the Academic awards in many cases bear the same nomneculature, there is a wide disparity in the competenceies of trainees developed through various programmes. Further, most of these institutes which were inherited from pre-independence time, did not possess even a minimal physical and staff infrastructure to cope with the manpower training needs of mmdern production proce:ses. In general, the vocational education and training in the country has remained unpopular because of lack of adequate physical facilities and the absence of positive socialtal attitudes towards tradesmen trainino. The Vocational Training Centres also did not produce meaningful programmes for meeting the needs of persons droppcng out from general streams of education at different levels. This situation has not been conducive to the development of vocational training as a legitimate and necessary form of education, comparable in utility to any other educational programme.

NATIONAL TRAINING PROJECT

6.7. Under the National Training Project launched by the Ministry .of Manpower, 3$ existing Voc-ational Institutes are being up-graded and strengthened and 6 new ones are

being established to enhance the output of skilled workers at the craftsmen level. Further, an effort is being made to involve the private sector in undertaking vocational training programmes through establishment of a Training Advisory Service and the in-plant training of 2,800 staff of the employers.

APPRENTICESHIP ORDINANCE

6.8. Some persons are also trained under the provisions of the apprenticeship training programme which at the moment is confined to a few industrial establishments (about 500), although under the Apprenticeship Ordinance quite a large number of industrial establishments are expected to administer such programmes. There are a number of shortcomings in the implementation of this Ordinance. The annual out-put from this provisions is under 1,000 skilled workers.

PRE-VOCATIONAL LEVEL (AGRO-TECHNICAL STUDIES IN GENERAL SCHOOLS)

6.9. Some headway has been made in introducing agro-technical courses in 5,000 schools of general education at the middle and secondary school levels with the main purpose of achieving a shift from general education towards technical education. These efforts have met with mixed success in view of the barriers inherent in transplanting

a technical culture in the humanities-dominated environment in general schools. It is also felt that the objectives of the vocationalization effort in earlier stages of schooling have been unrealistically allied to the employment market. The emphasis on the development of employable skills in the middle and secondary stages of education was somewhat misplaced, as the limited vocational components of these stages of education could only cater to developing motivations, technology-oriented attitudes and values among the young school-goers. This may have contributed to the sense of lack of success associated with the vocationalization effort in schools.

PROGRAMMES FOR FEMALES

6.10. Females constitute about 48% of our population but their proportion in the labour force is hardly 8%. Although efforts have been made in the past to progressively increase the opportunities for providing education and training to females, the overall perspective betrays a dismal picture. At the primary stage only 33% of the relevant age group are enrolled whereas situation at higher levels presents female enrolments in arts and science courses only and fewer in technical streams. With a low base providing meagre intake, Technical Education for girls has remained confined to the traditional home crafts such as tailoring, knitting and embroidery. For this purpose 95 Vocational Training Institutes for Girls are operating in the country. In recent years the legitimate need for designing middle-level technical education for the female population has been increasingly appreciated and a number of women polytechnics are being set upt to meet this need. Newer and non-traditional disciplines are being identified to diversify the job opportunities for girls and adult women.

NON-FORMAL PROGRAMMES

6.11. Certain programmes are also administered by public sector organizations for producing manpower tailored specially to their own needs. These organizations include WAPDA, Steel Mills, Railways, Karachi Shipyard, PIA, Health Department, Agriculture Department, Animal Husbandry, etc. They are essentially oriented to specific jobs in these disciplines and fall outside the formal system of technical education and training. Their contribution to the technical manpower training, though sporadic, is highly specialized. For lack of data, it is not possible to quantify the exact output from such programmes. It must be noted however, that the specialized programme run by the aforementioned organizations are limited in scope and most of their general technical manpower is drawn from the product of the formal educational system of technical education and training. The average annual out turn from all such programmes is estimated to be around 20,000. The advancement of technology is also making it necessary to mount programme of inter-disciplinary nature through the interaction of formal and non-formal systems of training.

6.12. Technical training, in Private Sector comprising private registered technical institutions, private-un-

registered institutions, Ustad-Shagird training etc., has also been contributing significantly to the training of skilled manpower in the country. Some private industries, also train their skilled workers for their own consumption, outside the purview of the Apprenticeship Ordinance. No survey has so far been carried out to assess the contribution made through this system. Some rough estimates appearing in the World Bank Appraisal Report of the Fifth Education (Vocational Training Project) place such output around 20,000 per annum.

7. OCCUPATIONAL TRAINING

In the preceding section, the overall system of technical and vocational education has been discussed. Within the overall system, craftsmen level training has been least attractive from the social demand point of view. However, with the outmigration of skilled workers to OPEC countries of the Middle East, the local market has been facing critical shortages for carrying out the development activities launched by the government under the Five Year Plans. The increased outmigration and critical shortage of skilled workers within the domestic labour market created a situation of wage differential by which the skilled workers or craftsmen started enjoying reputation for earning money and making a good living as compared to unskilled and the educated unemployed. Even the educated employed did not get the amount of money which the skilled workers/craftsmen had been getting in the open market. The critical shortage of skilled workers was also felt by the government and consequently a National Vocational Training Project was launched during the Fifth Five Year Plan.

7.2. Through the National Vocational Training Project, the craftsmen level training was streamlined; admission criteria for various trades was clearly spelled out; and attempts made for standardization of the skill training

imparted by the Government Vocational Institutes and the Technical Training Centres. They were brought under the umbrella of the National Training Bureau of the Ministry of Labour, Manpower, and Overseas Pakistanis. The requirements of admission as decided by the government are as follows:

1.	Age limit for admission:	16-35 year
2.	Minimum educational qualification required for admission:	8th class pass for all trades except Electrician; Radio & T.V. Mechanics; Radio and Air Conditioning Mechanic and Draftsman for which it will be 10th class.
3.	Admission Fee:	Rs.10/- per trainee.
4.	Tutition Fee:	Rs.10/- per month
5.	Non-Govt. Dues:	
	i) Printed matter and examination charges:	Rs.20/- per six months.
	ii) Welfare Fund:	Rs.5/- per six months
	iii) Security:	Rs.50/- (Refundable)

7.3. From the above it will be observed that Middle i.e. Junior Secondary Certificate has been made entry qualification to the Technical Training Centres and Vocational Institutes. In certain situations the educational qualifications are however relaxed. For instance on a visit to

to the Technical Training Centre Peshawar, it was revealed that two trades i.e. Carpenter and Tailoring required primary certificate as entry qualification; whereas for the trades of Auto Mechanic, Machnist, Welder and Plumber, Junior Secondary level (Middle) Certificate was a pre-requisite. The medium of instruction for all these trades is Urdu, but in certain subjects the English terms are inevitably used for which English literacy is also required.

7.4. The National Training Bureau has developed curriculum for all the trades which is followed in all the Technical Training Centers and Vocational Institutes in the country. It is not possible to give a detailed description of the curriculum content prescribed for all the trades. However, certain selected trades curriculum can be provided for International comparisons and further analysis of the relevance of general education curriculum to occupational training. For the trade of carpenter, as indicated earlier, the entry qualification is Primary; whereas for Auto Mechanic, Machinist, Welder and Plumber the entry qualifications are Junior Secondary. Their curriculum content can be seen in Annex V to IX. The relevance of general education curriculum to occupational training will be examined in the subsequent section.

7.5. The Overseas Workers Foundation has made arrangements for training tradesmen in the following fields:

1. Mason
2. Carpenter (Shuttering)
3. Plumber
4. Steel Fixer
5. Electrician (Domestic Wirring)
6. A/C & Refrigeration Mechanic
7. Welder/Steel Fabricator
8. Tracer
9. Auto Electrician
10. Civil Draftsman
11. Civil Surveyor
12. Auto Mechanic
13. Earth Moving Equipment Mechanic

7.6. This programme envisages intensive, practical and skill oriented training in the aforementioned fields. The syllabii have been designed to devote 25 to 30% time to theoretical instructions and 70 to 75% time to practical work. The minimum educational qualification required and course duration for these trades are given below:

S.No.	Trade	Education	Duration of Training
1.	Mason	Ability to read and write	10 weeks
2.	Carpenter (Shuttering)	Ability to read and write	17 "

3.	Plumber	Primary	12 Weeks
4.	Steel Fixer	Middle	12 "
5.	Electrician (Domestic Wiring)	Matric	17 "
6.	A/C & Ref. Machanic	Matric	17 "
7.	Welder/Steel Fabricator	Middle	12 "
8.	Auto Electrician	Middle	12 "
9.	Tracer	Matric with Science	17 "
10.	Civil Draftsman	Matric with Science	37 "
11.	Civil Surveyor	Matric	40 "
12.	Auto Mechanic	Middle/Matric	38 "
13.	Auto Mechanic	Middle/Matric	38 "
14	Earth Moving Equipment Mechanic	Middle/Matric and Auto Mechanic Course	38 "

7.7. In pursuance of its objectives, to train tradesmen, Overseas Workers Foundation was transferred control of Poly-Trade Schools at Islamabad and Karachi through a notification of Cabinet Division, Government of Pakistan.

8. RELEVANCE OF GENERAL EDUCATION CURRICULUM IN RELATION TO OCCUPATIONAL TRAINING

In the preceding sections, attempt has been made to provide the curriculum content of General Education, especially of those subjects which are comparatively considered more important, and that of occupational training in those trades for which the entry qualification are primary or junior secondary school certificate. In this section an attempt will be made to establish relationship between the curriculum content of general education and occupational training imparted in the Technical Training Centres. But before such an analysis is undertaken, it will be desirable to provide the structure of both primary and junior secondary school system. This will hopefully provide the reader proper perspective to comprehend the complexities involved in establishing one to one relationship between the content of General Education and that of Occupational Training imparted in the Technical Training Centres.

8.2. The Primary Education system in Pakistan is spread over five years which commences from pre-primary stage to primary, i.e. Grade I to V. Normally those children are admitted in the primary schools who have attained the age of five. In other words, five year old children are admitted in the First Grade. If the student

successfully complete the primary cycle in five years, so by the time of completion of the primary school certificate, the student has attained the age of 10 years.

8.3. The Junior Secondary school may either comprise I-VIII; or VI-VIII grades. A student who has not failed in any grade and has passed the junior secondary, i.e. VIII grade, may have attained the age of 13 years. Those students who are poor in their academic performance may spend more years because a student who has failed in a particular grade will have to repeat the courses and remain within the same grade unless he/she qulifies the examination. In such situation, the students may have attained a higher age limit both in primary as well as in junior secondary.

8.4. In the Section on Occupational Training, the requirements of admission as decided by the Government for the Technical Training Centres or Vocational Institutes were indicated. It may have been noted that the age limit for admission was prescribed as 16-35 years. This means that fresh graduates of the primary and junior secondary schools are not eligible to seek admission in the TTCs. They have to wait until they attain the age of 16. Till such time they may either work on the farms or start working with some mechanics as helpers or join the illiterates in the streets. In all these situations whatever he/she has learned in the school is unlearnt because he/she is not in a position to use those concepts which he/she acquired in the school.This makes the investment in education

as disinvestment.

8.5. In view of the fact that physical work is inolved in most of the trades, one cannot expect a fresh primary school graduate to work for hours and acquire the necessary skills for doing certain jobs. Keeping in view such a situation, the National Training Bureau has not only fixed the age limit but also the academic qualifications, i.e. Middle (Junior Secondary). This has been relaxed in the TTC Peshawar where primary certificate holders have been made eligible for admission into carpenter and tailoring trades. But such primary school certificate holders were those whose age exceeded that of 16 years. On the contrary, TTC Gulberg and Moghulpura had maintained the standards set by the National Training Bureau. This was because of the fact that Lahore is the industrial and commercial centre with tremendous job potential. There is tremendous amount of pressure for admission into the Technical Training Centres which forces the management to maintain and enforce the national standards. The situation in Peshawar is quite different and because of the Afghan refugees, the job market has squeezed considerably. In fact the T.T.C.Peshawar has launched a tailoring course for the Afghan refugees in collaboration with the German government.

8.6. It was not possible to visit all the Technical Training Centres and Vocational institutes in the country. An attempt was however made to visit the Technical Training Centre at Peshawar in NWFP; and two Technical Training Centres one at Gulberg and another at Moghulpura in Lahore City of the Punjab Province. Theses visits provided a deeper understanding of the issues and problems faced by the management of the Technical Training Centres and their faculty as well as students. The findings are reported in the following pages of this presentation.

8.7. In the Technical Training Centre Peshawar, the total enrolment in various trades was 367. The tradewise enrolment of first and second year students (combined) was as under:

1.	Draughtsman	58
2.	Electrician	63
3.	Radio/T.V.(Mechnaic)	38
4.	Refregiration/Air conditioning	38
5.	Machine Shop	45
6.	Welder	23
7.	Plumber	10
8.	Auto-Diesel	53
9.	Carpenter	24
10.	Tailoring	15
	Total.	367

8.8. As stated earlier that for the carpenter and tailoring trades, the entry qualifications (academic) were relaxed and primary school certificate holders were made eligible to seek admission. The carpenter trade classes were visited in which there were 10 & 14 students in the fist and second year training courses respectively. From among the 24 students, it was observed that there was only one trainee who had primary school certificate; 19 trainees who had passed primary but were below Junior secondary (middle); three with Middle certificate; and one with Matric (Secondary). The combination of students with a variety of academic backgrounds definitely pose problems for the instructional staff. But since the training is more practical oriented, therefore those with lesser academic background may be having slight problems in theory.

8.9. During discussions with the students of carpentry trade, it was revealed that there is more emphasis on practical training. During the course of training, the trainees are exposed to basic theories, drawings and trade maths. The tools used in the trade are mostly called with English names. This necessitate certain basic level knowledge of reading and writing both Urdu and English. In fact the medium of instruction for all the trades is Urdu which is taught in the school system. The students who were interviewed were of the view that for the trade of carpenter, the basic knowledge of measurement is of considerable importance. This facilitate the job of the trainee in understanding the dimensions and measurement of various types of activities related to wood work.

8.10. In the Welding Trade, TTC Peshawar had 23 students of which about 50% were matriculates (high school graduates). The number of high school graduates undergoing training in this trade could be attributed to either limited employment opportunities for the matriculates in the labour market; or the prospects of seeking employment in the OPEC countries of the Middle East or attractive remunerative conditions in the domestic labour market. Similarly, in the Auto-Mechanic trade, more than 50% of the trainees had higher academic achievements than prescribed for entry of training in a particular trade. The trainees in these trades did not report any problem in terms of comprehending the concepts, techniques and methodologies provided to them in their respective trades. When asked whether illiterates can do such training without difficulty. Their response was that education is necessary and whatever is taught in the education system is of relevance for the occupational training. For instance, they said, Urdu is a medium of instruction in occupational training; English is used for the English terms and nomenclatures; mathematics helps in computations and measurements; science allows them to comprehend and understand various scientific processes; and Islamiyat provides them an appreciation of the moral, spiritual and ethical values of Islam. There has been a general feeling of deficiency in technical drawings. All the students (three in carpentry; two in welding; and two in auto-mechanic trade) did not have a background of Agro-Technical Education which has been introduced alongwith the General Education in certain selected junior secondary/secondary schools.

8.11 The Technical Training Centre Gulberg is located in Lahore which offers occupational training in a variety of trades. Those trades for which the junior secondary certificate is required as one of the entry qualifications and taught in this institutions are: Turner, Machinist, Fitter, Carpenter, Welder, and Painter. The cumulative enrolment of the Centre was 463 in ten trades. Tradewise enrolment is given below:

1. Electrician	77
2. Radio/TV (Mech)	76
3. Ref/Air Conditioning (Mech)	71
4. Draughtsman (Mechnaical)	45
5. Turner	63
6. Machinist	19
7. Fitter General	52
8. Carpenter	29
9. Welder	25
10. Painter	6
Total.	463

8.12. The trades in which the instructors as well as students were interviewed are: Fitter, carpenter, Welder, Painter. In each trade two students were interviewed alongwith their senior instructor. This was done so as to get maximum information regarding the relevance of general education curriculum to occupational training needs. It was observed that though the minimum entry qualification(Academic) was Middle, i.e. Junior Secondary, yet there were students who were high school graduates. Those who claimed to be Middle were in fact the students having failed in the secondary certificate (Matric) examination.

8.13 An outside observer is impressed by the seriousness of attitude with which the trainees were doing their respective trade exercises. Every student had a job-sheet in front of him. This job sheet was found to be in English and with certain technical drawings. It was felt that the occupational training has no relevance at all with the primary education system. In fact it is more suited to those who have gone through the secondary education system. From the scheme of studies both for primary and secondary, it may have been observed that at the primary level, there is stress on first language and second language; whereas in the junior secondary the third language i.e. English is introduced. If we have to make the content of general education relevant to the occupational training needs, then we may have to introduce English as a third language at the primary stage. This proposition does not seem to be sound as the age of the child is such that he/she cannot be overloaded with so many subjects. In fact there is crying need for reducing the number of subjects at the primary level. Those who have gone through the secondary school were of the view that secondary school certificate should be made as academic requirement for admission into the Technical Training Centre. Similar observations were made by the respective trade instructors.

8.14. The instructors of Fitter, Carpenter, Welder, and Painter trades were also interviewed. The Instructors in Fitter trade were of the view that the school system must expose the students to

technical subjects and suggested that drawing and mathematics must be made compulsory. The Carpentry instructor emphasized on Drawing and Urdu ; and the instructor of Welding trade emphasized on Drawing and English. The aforementioned revelations of the respective trade instructors suggest that the subject of Drawing should be made compulsory for the students as this subject is of vital importance for those who intends to join the technical vocations.

8.15. The next Centre was Technical Training Centre Moghulpura in Lahore. This Centre had an enrolment of 361 against the sanctioned capacity of 402. There are eight trades in which instructions are imparted. Those are: Draughtaman Mech; Electrician, Auto-Mechanic (for these trades Matric is the entry requirement); Plumber/Sanitary Inst; Welding; Turner, Machinist,; and Millwright (for these trades entry requirement is Middle, i.e. Junior Secondary). The tradewise enrolment is given below:

1. Draughtsman Mech.....	48
2. Electrician.....	64
3. Auto Mechanic.....	75
4. Plumber/Sanitary Inst.....	33
5. Welding.....	26
6. Turner.....	36
7. Machinist.....	24
8. Millwright.....	55
Total:	361

8.16. More than 80% of the students were having the secondary certificates and there were very few who possessed Middle level certificates. Those having Middle level certificates were in majority like plumbing and

8.17. Two students from each of the trades like Machnist, Plumbing, and Welding were interviewed alongwith their respective senior instructors. In the plumbing trade the students who were interviewed were of the view that Matric should be the entry qualification for the plumbing trade where the majority of the trainees were possessing junior secondary certificates. Since the students are following job sheets given to them by their respective instructors, therefore almost all the students were of the view that technical drawings, mathematics, science, and English must be emphasized in the school system. There were certain instructors who lamented that Matric students studying science subjects are not provided with combination of drawing subject. Drawing and Science used to be combination for those students opting for Pre-engineering courses.

Technical Training Centres.

9.2. At the Primary level, the students do not study English; whereas in the Technical Training courses there is emphasis on English terminologies and nomenclatures. In order to make the technical training accessible to primary school graduates, it will be necessary to convert such terms into Urdu which is the medium of instruction even in the Technical Training Centres. Another aspect of the problem is that for various trades offered in the Technical Training Centres, the entry qualification is Middle/Matric. Even the students of the Technical Training Centres and the faculty members were of the view that the entry

qualifications for those trades requiring junior secondary may be raised to Matric so that the trainees are in a position to speak on a common platform having common understanding of theory as well as practice. This will deprive the primary school graduates from technical training. Perhaps because of this limitation, the Working Group on Technical Education for the Sixth Five Year Plan proposed that: "A parallel stream of job oriented vocational education should be started in a separate school system to be known "Trade Schools" at two levels: one on the completion of 8 years of schooling and the other consisting of the drop-outs from the primary and middle stages." This scheme, though provided in the Sixth Five Year Plan, has not found practical manifestation because of the uncertainties surrounding the concept of Trade Schools.

9.3. The age limit prescribed for entry into the Technical Training Centres also deprives the fresh graduates from the primary and junior secondary schools for quite some time. For instance the entry qualification in terms of age are 16-35 years. Those who are less than 16 have to waite for quite some time to be eligible for admission into the Technical Training System. In such situations, the students dropped out of the primary or junior secondary system may fall into the group of uneducated or illiterates. Without any further readings and writings, whatever they may have learnt in the school system will lose relevance to the technical training system. Some mechanism either by way of providing Trade Schools or relaxing the entry qualification of age in the technical training schools/

vocational training instututes needs to be devised.

9.4. A stream of Agro-Technical Education has been introduced in the General Education system in certain selected schools of the country. There was not a single student/trainee in the TTCS visited who had undergone through the Agro-Technical education system. Therefore it was not possible to ascertain whether the Agro-Technical Education imparted in the secondary school system has any relevance with the occupational training. From the existing situation in the TTCS it appears that the Agro-Technical Scheme has not created any significant impact in improving the intake to Technical Training Institutions. In fact some of the instructional staff of the technical training centres were of the view that basic training in technical/vocational subjects needs to be imparted in the secondary school system. This indicates that Agro-technical studies are not finding any acceptance with the TTCS.

RECOMMENDATIONS

9.5. The preceding discussion suggests that following steps needs to be taken so as to establish a link of the content of general education to occupational training:

1. More time needs to be given to Mathematics, Science, Technical Drawing at the junior secondary level to emphasize practical work and problem solving.

2. For the drop-outs of the primary education system, the separate arrangements in the form of special trade schools should be made, which do not administer curriculum with heavy weightage on science, mathematics and drawing. For these students skill oriented instructions with minimal theory will have to be introduced.

3. The present weightage given to languages needs re-consideration of the curriculum specialists to squeeze more time for subjects forming base for technical education.

4. The technical terms as well as the job-sheets/ drawings presently in English should be converted into indigenous language (Urdu) for better comprehension and understanding.

5. Although the minimum qualifications for admission to a number of trades is junior secondary school, yet the intake comprises both the students with higher qualification such as Matric or Matric fail and Junior Secondary. This poses problem of diversity in the educational competence of the students body. The National Training Bureau may re-consider the entry qualifications taking into account the needs of a particular trade and then strictly enforce it to achieve uniformity in students' body.

6. For those students persuing studies at the secondary level, the scheme of studies for science as well as general group does not specify Technical Drawing as a compulsory subject.

7. Vocational guidence programmes are almot non-existent. These need to be strengthened.

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Annex-I

OBJECTIVES OF URDU TEACHING

1. After observation the child may be able to distinguish and recognise things.

2. Differentiate the voices and understand them properly.

3. Speek with exact pronunciation and communicate properly.

4. Read written material for the sake of knowledge and derive pleasure from such reading.

5. Write with correct spellings.

6. Derive correct results from events.

7. Preserve the information regarding experiments and observations and use it at appropriate time.

8. Use the vocabulary and be aware of the language structure.

9. Develop the reading habit of other books.

10. Learn to love the Urdu language and be proud of it.

11. To be aware of the National culture and civilization and be proud of it.

12. Respect the Islamic beliefs and way of life.

The realization of these objectives will enable the child to:-

a) observe the things around and express ideas both in writing and orally.

b) understand the correct meanings of the recorded conversation, telephones, television, radio programmes, debates, speeches and conversation.

c) have holdon proverbs and idioms for daily use. Have no problem in narrating a story, discussing and revealing the conversation.

d) read, understand and enjoy by studying a paragraph at a reasonable speed.

e) read loudly with exact spellings and correct pronunciation.

f) read and comprehend according to his age, magazines, legal documents of land and property, bills, receipts, sign boards, traffic signals and advertisements.

g) write accurately, with reasonable speed, reports for health and cleaniness, letters and invitations, keep record of house hold activities, write applications and fill in the forms such as Money Order Form, etc.

h) use dictionary and other books which are needed such as railway time table, calendar and telephone directory.

i) enjoy and take benefit from reading in leisure.

j) express his creative abilities.

k) have basic knowledge about Pakistan, and be aware that Muslims got this country for the sake of their faith and civilization.

l) be aware with National obligations and prove it by practice, such as to respect the National Flag and National Anthem, respect the national leaders and love Islamic values.

PRIMARY I - V

CURRICULUM FOR MATHEMATICS

OBJECTIVES OF TEACHING MATHEMATICS

A. General

1. Satisfy the mathematical needs and interests of the child through his development so that he may use it effectively in his personal and social life.

2. Develop a disciplined mind and exercise sound judgement and reasoning in relation to the events of every day life.

3. Provide the basic ground work for the understanding of scientific reasoning and calculation.

4. Create favourable attitudes towards and interest in Mathematics showing the contribution it has made and is making to our present civilization and culture.

5. Provide opportunities for the guided discovery and creation of patterns.

B. Specific

1. To acquire basic knowledge of numbers.

2. To develop appropriate skills of computation in four fundamental operations.

3. To acquire basic knowledge of two and three dimensional geometric figures.

4. To develop ability to solve practical problems by the application of fundamental measures (money, time, weight, length/...).

5. To understand the presentation of data in visual form.

REVISED CURRICULUM IN MATHEMATICS

Class-I

Unit-I. Pre-Number Concepts.

1. More than; Less than.

2. Concepts of bigger and smaller, heavier and lighter, longer and shorter.

Unit-II. Real Numbers.

1. Numbers from 1 to 9.

2. Writing numerals from 1 to 9

3. Concept of Zero.

4. Inequalities involving numbers from 1 to 9, without symbols.

5. Introduction of the decimal numeration system.

6. Numbers from 10 to 100.

7. Writing random numerals from 10 to 100.

8. Writing random numerals from 1 to 100.

9. Concepts of half and quarter (may not be written as ½ and ¼).

Unit-III. Alegebraic Operations.

1. Addition of two numbers sum being not more than 9.

2. Addition of two numbers, sum being up to 18.

3. Addition of two numbers, sum being up to 50.

Unit-IV. Money.

Recognition of Pakistani coins.

Unit-V. Calender.

Names of days of the week (oral)

Class - II.

Unit-I. Real Numbers.

1. Extending decimal numeration system up to 1000.

2. Counting by two's.

3. Concepts of one third, two third and three fourth.

4. Informal concept of commutative property of addition.

Unit-II Algebraic Operations.

1. Addition of two numebrs sum being up to 99. (without carrying)

2. Addition of two numbers sum being upto 999.

3. Addition of three numbers sum being upto 999.

4. Subtraction of numbers with borrowing upto 99; without borrowing up to 999.

5. Introduction of concepts of multiplication and division.

6. Tables of 2,5,10, multiplications.

Unit-III. Geometry.

1. Grouping familiar three dimensional objects.

2. Grouping similar objects (Identifying a circle, a triangle, a rectangle and a square).

3. Open and closed figures, their inside and outside.

Unit-IV. Money.

Recognition of Pakistani notes.

Unit-V. Calendar.

1. Names of Islamic and solar (Christian) months (oral)

Class-III

Unit-I. Real Numbers.

1. Concept of number ray.

2. Extending decimal numeration system upto 1,00,000(Lac).

3. Concept of fractions.

4. Concept of a proper fraction,

5. Informal concept of associative property of addition.

6. Informal concept of commutative property multiplication.

Unit-II. Algebraic Operations.

1. Addition of numbers represented by two, three or four digits.

2. Subtraction of numbers represented by three or four digits.

3. Multiplication tables up to 10 x 10.

4. Multiplication of a number represented by three digits by numbers up to 99.

5. Division of numbers represented by 2 to 3 digits by numbers up to 9.

6. Addition of proper fractions with same denominator. (sum being a proper fraction, denominator upto 9).

7. Subtraction of proper fractions with same denominator (denominator up to 9).

Unit-III. Measurement.

1. Introduction of Standard International (S.I.U) Units.

2. Addition and Subtraction of compound quantities.

3. Problems involving addition and subtraction of Rupees, grams, kilograms. metres and centimetres.

Unit-IV. Geometry.

Drawing a line segment, a circle, triangle, a rectabgle and a square.

Unit-V. Calendar.

Telling time (hours, half hours, quarter hours, minutes).

Class-IV

Unit-I. Real Numbers.

1. Extending decimal numeration system up to million and crore.

2. Introduction of numerals.

3. Even and odd numbers.

4. Informal concept of associative property of multiplication.

5. Informal concept of distributive property.

6. Introduction of improper and compound fractions.

7. Equivalent fractions.

8. Comparision of fractions.

9. Informal concept of commutative property of addition and multiplication (involving fractions and integers)

Unit-II. Algebraic Operations.

1. Introduction of decimal fractions.

2. Multiplication of numbers represented by three digits.

3. Division of numbers represented by 3 to 4 digits by numbers up to 99 (with or without remainder).

4. Problems involving four fundamental operations by using brackets.

5. Addition and subtraction of two fractions proper and improper with same denominator, compound with same denominator, simple proper fractions with different denominators.

6. Multiplication of two fractions.

7. Addition and subtraction of decimal fractions up to two places of decimal.

Unit-III. Measurement.

1. Addition and subtraction of compound qualities.

   a. Litres, millilitres, grams, kilograms, kilometres, metres, centimetres and millimetres.

   b. weeks, days, hours and minutes.

Unit-IV. Geometry.

1. Measuring a line segment in centimetres and millimetres.

2. Concepts of angle, boundary and region.

3. Finding perimeter of rectangular and square shapes.

Unit-V. Graph.

Reading a picture graph.

Class-V

Unit-I. Roman numerals.

1. Introduction of decimal fractions up to three places.

2. Roman numericals up to 20 and for 50,100 and 1000.

3. Divisibility, factors, multiples, concept of prime and composite numbers, Highest common factor and least common multiple of natural number.

4. Informal concept of associative property of addition and multiplication (involving fractions and integers).

Unit-II. Algebraic Operations.

1. Reducing a fraction to the simplest form.

2. Addition and subtraction of decimal fractions up to three places.

3. Multiplication of a decimal fraction by a whole number.

4. Multiplication of two decimal fractions.

5. Division of a decimal fraction by a whole number.

6. Division of a decimal number by a decimal fraction.

7. Conversion of a decimal fraction into common fraction. Conversion of a common fraction (with denominations of 2/5) into decimal fraction.

8. Use of brackets in common and decimal fractions.

9. Problems involving addition, subtraction, multiplication and division of common and decimal fractions.

Unit-III. Unitary Method.

Simple cases of unitary methods

Unit-IV. Average.

Simple cases of average.

Unit-V. Geometry.

1. Concepts of angle, right angle, right triangle and quadrilatonal.

2. Determining the area of a right triangle

3. Determining perimeter of a triangle and various types of quadriterals

4. Concepts of cube, cuboid, volume and its units.

Unit-VI. Graph.

1. Reading a bar and a line graph.

NOTE

Use of geometry box is not required for classes I-V.

AIMS AND OBJECTIVES OF 1975 CURRICULUM

The new curriculum is designed to meet the following broad aims and objectives:

1. To enable the child to acquire an elementary knowledge of numbers and appropriate skills of quantity and figures and use them efficiently.

2. To develop skills in the application of numbers and other mathematical structures in relevant situations.

3. To develop understanding of new mathematical concepts of set, measurement, relationship and skills in computation and problem solving through the provision of opportunities to explore, discover, describe and record relationships.

4. To enable the child to solve mathematical problems which have a practical value in practical life situations easily and accurately.

5. To develop the ability to construct and interpret graphs and to present quantitative data in tabular form and to use simple statistical techniques.

6. To motivate the child to discipline the mind and to exercise sound judgement and reasoning in relation to the events in everyday life.

CONTENT OF COURSES (VI-VIII)

CLASS - VI.

1. Revision and exercise of work done on sets from Classes I to V.

   Tabular and descriptive notations of a set. Equality of sets. Disjoint and overlapping sets. Finite and infinite sets. Universal set. Union and intersection of two sets.

2. Concepts of an open (arithmetical) sentence. Idea of a variable. Replacement sets. Solution sets. Equalities and inequalities in the set of integers.

3. Continuation of factors, Divisibility, H.C.F. and L.C.M. Fractions (common & decima), Average.

4. Percentage with simple applications Profit and loss.

5. Area of regions bounded by triangles and parallelograms. Perimeter of triangles and parallelograms. Area of a triangular region is half the area of a region bounded by a parallelogram.

6. Points between the beyond line-segment, ray, half-line and number-line. Measurement of an angle, kinds of angles, sum of the angle measurements of a triangle, Plan. Idea of space, cube, cuboid and sphere. Volume of cube and cuboid.

7. Construction of circles of given radii. Bisection of a line segment and of an angle. Idea of symmetry (in geometric figures). Drawing perpendicular to a line. Construction of angles of 60, 30 , 90 , and 45 Making angle congruent to a given angle.

CLASS - VII

1. Complement of a set. Difference of sets. One to one correspondence. Venn-diagrams (Union and intersection of two sets, complementation and difference).

2. Directed numbers, System of integers.

3. Fundamental operations on algebraic expressions, sentences and equations.

4. Ratio and proportion. Inheritance and partnership.

5. Mean, mode and median.

6. Compound interest (Simple cases).

7. Square root by factor method.

8. Decimals.

9. Classification of triangles, Interior and exterior of an angle and of a triangle. Building geometric figures from polygons. Regular polygons. Circumference of a circle and area of a circular region. Bar-graph, line-graph and -graph. Construction of a triangle with the given data excluding ambigous case. Construction of square, rectangle and parallelogram.

CLASS - VIII.

1. Review of algebra of sets.
   Union and intersection involving three sets (including venn-diagrams).

2. Ratio and proportion (inverse and compound).

3. Numeration systems with bases 2 and 5.

4. System of rational numbers.

5. Square room by division methods

6. Evaluation of algebraic expressions. Simplification of algebraic expressions involving brackets.

7. Formulae for: $(a \pm b)^2$, $(a^2 - b^2)$ and $(ax + b)(cx + d)$.

8. Factors of: $(a^2 - b^2)$, $(a \pm b)^2$ and ax^2+bx+c.

9. Finding solution sets of linear equations and their application to problems.

10. Review of fundamental concepts of geometry. Complementary and supplementary angles, Pythagoras theorem without formal proof and its application. Parallelism and Playfair's axiom. Kinds of quadrilaterals & their construction. Area of regions bounded by quadrilaterals with the help of Hero's formula. (Formal proof of Hero's formula is not required). Drawing a line parallel to a given line. Dividing a line segment in a given ratio. Cylinder, Cone, prism & Pyramid. Volume and surface of a cylinder and cone.

11. Revision Exercises.

REVISED CURRICULUM CLASSES VI-VIII (January 1984)

MATHEMATICS

SPECIFIED OBJECTIVES FOR CLASSES VI - VIII.

1. To enable the child to acquire elementary knowledge of number system.

2. To develop skills in the application of numbers and other Mathematical structures in relevant situations.

3. To develop understanding of modern mathematical concepts.

4. To enable the child to solve mathematical problems which have a practical value in life situations.

5. To enable the child to develop the ability to measure and construct geometric figures.

6. To develop the ability to present and interpret quantitative data in tabular and graphic form.

MATHEMATICS CURRICULUM VI-VIII.

Course Content

Class VI

Unit-I Algebraic Operations.

i) Introduction of directed numbers.

ii) Continuation of Lowest Common Multiple (L.C.M.) and Highest Common Factor (H.C.F.) by division method.

iii) Problems involving H.C.F. and L.C.M.

iv) Algeraic operations involving brackets for common and decimal fractions.

v) Conversion of a common fraction into decimal fraction and vice-versa.

Unit-II Ratio and Proportion

i) Ratio and its application to inheritance and partnership.

ii) Introduction of direct proportion and its simple application.

iii) Continuation of unitary method.

iv) Use of ratio with unitary method as a special case.

Unit-III Averages.

i) Continuation of averages.

Unit-IV Algebra.

i) Algebra as generalised arithmetic-use of symbols for numbers.

ii) Algebraic expressions.

iii) Simple substitution in algebraic expressions and operations on them.

iv) Open sentences.

v) Examples of known arithmetical formulae/ expressed algebraically.

vi) Concept of constants and variables.

vii) Equalities and inequalities for expressions involving integers only.

Unit-V Geometry

i) Concept of point, line segment, ray and line, perpendicular to a line.

ii) Introduction of the units of measuring angles.

iii) Measurement of angles.

iv) Construction of an angle by using protractor.

v) Congruence of angles.

vi) Types of angles.

vii) Types of triangles and quadrilaterals.

viii) Construction of a circle of given radius.

ix) Bisection of an angle.

x) Bisection of a line segment.

xi) Drawing the perpendicular to a line.

xii) Construction of angles of 60, 30, 120, 90, and 45 degrees.

xiii) Making angles congruent to a given angle (by compass)

xiv) Area of regions bounded by parallelograms and triangles, volume of cube and cuboid.

Unit-VI Graph

i) Reading a bar and a line graph (continued).

CLASS - VII

Unit-I Sets

i) Concept of a set.

ii) Elements of a set.

iii) Tabular and descriptive methods of writing sets.

iv) One-to-one correspondence in two sets, equivalent, non-equivalent sets. (Finite sets only)

v) Operations of union (U) intersection ( ) amd dofferemce pf twp sets/

vi) The null (empty) set and universal set.

vii) Complement of a set.

Unit-II Algebraic operations.

i) Problems involving fractions.

ii) Square root of natural numbers and fractions by factor method.

Unit-III Ratio and proportion.

i) Ratio and proportion (continued).

ii) Continued ratios.

Unit-IV Percentages.

i) Concept of percentage, profit and loss.

ii) Application of percentage in Zakat, commission, profit and loss in partnership.

Unit-V Algebra.

i) Simplification of algebraic expressions.

ii) Fundamental operations on algebraic expressions.

iii) Linear equations in one variable.

iv) Equivalent equations.

v) Solution of linear equations in one variable.

Unit-VI Geometry

i) Concept of parallelism.

ii) Complementary and supplementary angles

iii) Construction of regular pentagon, hexagon and octagen with the help of protractor/compass.

iv) Construction of a triangle with given data (excluding ambiguous cases).

v) Properties of parallelograms rectangles and squares.

vi) Construction of parallelograms rectangles and squares.

vii) Circumference of a circle.

viii) Area of a circular region.

ix) Surface area of a cylinder.

x) Volume of a cylinder.

xi) Problems pertaining to area of a rectangular region and volume of a cube.

Unit-VII Graphs.

i) Drawing a bar-graph, line-graph and diagram.

CLASS - VIII

Unit-I Sets.

1) Subsets.

2. Universal set.

3) Equality of sets.

4) Difference of two sets, complement of a set. (continued)

5) Continuation of union and intersection of two sets.

6) The power set.

Unit-II Real Numbers.

1) System of rational numbers.

2) Numeration system with base 2 and 5.

3) Operation on directed numbers.

Unit-III Algebraic operations

1) Square root by division method.

2) Conversion of numbers from decimal system of numbers in the system with base 2 and 5 and vice versa.

3) Addition, subtraction and multiplication of numbers in the systems with base 2 and 5.

4) Simplification of algebraic expressions involving brackets.

5) Formula for $(a \pm b)^2$, $(a + b)(a - b)$ and $(ax + b)(cx + d)$ and their applications.

6) Factors of expressions of the type $(ka \pm kb + kc)$, $(a \pm b)^2$, $(a^2 - b^2)$ and $ax^2 + bx + c$.

Unit-IV Algebraic expressions and sentences.

i) Continuation of solutions of linear educations in one variable and their application to problems.

Unit-V Ratio and proportion.

i) Direct and inverse proportion (compound cases)

ii) Application of continued ratios, direct and inverse proportion.

Unit-VI Percentage.

Application of percentage in computation of growth, profit and loss, zakat and civic taxes.

Unit-VII Geometry.

1) Pythagoras theorem (without formal proof) and its application.

2) Construction of a line parallel to a given line.

3) Dividing a line segment into congruent segments.

4) Dividing a line segment in a given ratio.

5) Construction of a quadrilateral from given data.

6) Area of triangular region by Hero's formula.

7) Area of regions bounded by quadrilateral.

8) Surface area of a cone.

9) Volume of a cone.

AIMS AND OBJECTIVES OF SCIENCE TEACHING PRIMARY LEVEL 1973

Science at the elementary stage be taught as an integrated course reflecting the essential unity of science as a whole to children who in real life experience their environment as a whole. It should aim at helping children to develop concepts of science through the discovery method and further bring them to an appreciation and understanding of their environment as a whole. The goal should be to bring the pupil to a stage where he takes delight in being involved in learning science and feels committed to continue its study.

Main Aims

Although the specific aims of teaching science at different levles of education vary, the main aims remain the same as outlined below:

1. To achieve a broad and genuine appreciation and understanding of different aspects of science.
2. To promote scientific literacy and provide scientific and technological manpower in the country,
3. To develop scientific approach in the young pupils so that they acquire ability to apply knowledge

gained towards a solution of their problems.

4. To provide opportunity to an individual to determine his interests and aptitudes in science as a vocation.

5. To improve the general economy of the country and raise the living standard of our people through application of science and technology.

General Objectives for Teaching Science at the Elementry Stage

i) To develop the spirit of inquiry and inquisitiveness.

ii) To help the child to understand his physical environment and the interrelationship that exists in nature

iii) To develop an ability to observe carefully and to report facts accurately and understandingly.

iv) To acquaint the children with the various subject areas of science and to integrate the broad subject matter areas of science so that the children can begin to see science in its total perspective.

v) To help children to acquire and apply knowledge and manipulative skills.

vi) To develop the scientific attitudes and aesthetic awareness.

vii) To develop the habit of critical thinking and to draw inferences from observataions

viii) To help children develop basic concepts of various disciplines of science.

CONTENTS OF COURSES

(CLASS-I (Age 5 +)

Living Things

1. Animals vary in their physical appearance.
2. Animals differ widely in their size.
3. Animals differ widely in their shape.
4. Animals differ in their movement pattern
5. Plants vary in their physical appearance.
6. Plants vary in their ralative size.
7. Plants vary in the shape of their leaves.
8. Plants have flowers of different size, shape and colour.

Matter and Energy

1. Material objects can be moved.
2. Motion can be slow as well as fast.

3. Day and night are related to the rising and setting of the sun.
4. Morning, noon and evening are related to the position of the sun.
5. Weather changes by wind, rain and clounds.

CLASS-II (Age 6 +)

Living Things

1. Animals have different kinds of coats.
2. Animals differ in their living habits and habitats.
3. Animals differ in their eating habits.
4. Animals are useful in many ways.

5. Plants are different inshape and size or stem.
6. Plants have roots of different size and shape.
7. Plants have seeds of different kinds.
8. Plants are useful in many ways.

Matter and Energy

1. There are various material objects around us.
2. Material objects exist in three states - solids, liquids and gases.
3. Some objects are heavy, others are light.
4. A force is necessary to make things move and make the moving things stop.
5. Force is push and pull.
6. It takes greater force to move heavy objects than light ones.
7. Heat is produced by burning and rubbing things
8. Heat is screened off by the intervention of a suitable object.
9. More heat is obtained from a source at a shorter distance and less heat at a longer distance.
10. Light is also screened off by the intervention of an opaque object. Light passes through transparent object.
11. More light is obtained from a source at a shorter distance and less light at a longer distance.

12. a) Shadows are cast in opposite direction to the sun or source of light.
    b) Shadows of objects change in length during the day.
    c) Shape of shadows resembles the shape of objects.

Earth and Universe

1. The earth, the sun, the moon and the stars are all spherical bodies.
2. The earth has many surface features-mountains, valleys, hills, rivers,lakes, plains and oceans.
3. The moon appears in different phases during a month.
4. Idea of four directions is related to the rising and setting of the sun.
5. Difference in warmth during day and night and in sunny and shady places is related to the position of the sun.
6. There are four seasons in a year- winter,summer, spring,autumn.

CLASS -III (Age 7 +)

Living Things

1. Animals require food, water and air for living.
2. Animals have coats suitable to their environment.
3. Birds are alike in having two wings, two legs

and a body covering of feathers.

4. Insects are alike in having six legs, two feelers and three body parts - head, thorax and abdomen.
5. Mammals are alike in having hair on their bodies and in feeding milk to their young ones.
6. Most plants have roots, stems and leaves.
7. Most plants need soil, water, air and light for growth.
8. Flowers produce fruits and seeds.
9. Crops grow in different seasons.

Matter and Energy

1. Matter is anything that occupies space and has weight.
2. Matter exists in three states-solid, liquid, and gas.
3. Matter can be changed from one state to another state.
4. Water exists in nature in all the three states- - ice, water and vapour.
5. There are many sources of water.
6. Water is useful for human beings, animals and plants. (Essential for life)
7. Air is matter. It occupies space and has weight.
8. Air is essential for man, animals and plants.

CLASS - VII

1. Complement of a set. Difference of sets. One to one correspondence. Venn-diagrams (Union and intersection of two sets, complementation and difference).

2. Directed numbers, System of integers.

3. Fundamental operations on algebraic expressions, sentences and equations.

4. Ratio and proportion. Inheritance and partnership.

5. Mean, mode and median.

6. Compound interest (Simple cases).

7. Square root by factor method.

8. Decimals.

9. Classification of triangles, Interior and exterior of an angle and of a triangle. Building geometric figures from polygons. Regular polygons. Circumference of a circle and area of a circular region. Bar-graph, line-graph and -graph. Construction of a triangle with the given data excluding ambigous case. Construction of square, rectangle and parallelogram.

CLASS - VIII.

1. Review of algebra of sets.
   Union and intersection involving three sets (including venn-diagrams).

2. Ratio and proportion (inverse and compound).

3. Numeration systems with bases 2 and 5.

4. System of rational numbers.

5. Square room by division methods

6. Evaluation of algebraic expressions. Simplification of algebraic expressions involving brackets.

7. Formulae for: $(a \pm b)^2$, $(a^2 - b^2)$ and $(ax + b)\ (cx + d)$.

8. Factors of: $(a^2 - b^2)$, $(a \pm b)^2$ and ax^2+bx+c.

9. Finding solution sets of linear equations and their application to problems.

10. Review of fundamental concepts of geometry. Complementary and supplementary angles, Pythagoras theorem without formal proof and its application. Parallelism and Playfair's axiom. Kinds of quadrilaterals & their construction. Area of regions bounded by quadrilaterals with the help of Hero's formula. (Formal proof of Hero's formula is not required). Drawing a line parallel to a given line. Dividing a line segment in a given ratio. Cylinder, Cone, prism & Pyramid. Volume and surface of a cylinder and cone.

11. Revision Exercises.

REVISED CURRICULUM CLASSES VI-VIII (January 1984)

MATHEMATICS

SPECIFIED OBJECTIVES FOR CLASSES VI - VIII.

1. To enable the child to acquire elementary knowledge of number system.

2. To develop skills in the application of numbers and other Mathematical structures in relevant situations.

3. To develop understanding of modern mathematical concepts.

4. To enable the child to solve mathematical problems which have a practical value in life situations.

5. To enable the child to develop the ability to measure and construct geometric figures.

6. To develop the ability to present and interpret quantitative data in tabular and graphic form.

MATHEMATICS CURRICULUM VI-VIII.

Course Content

Class VI

Unit-I Algebraic Operations.

i) Introduction of directed numbers.

ii) Continuation of Lowest Common Multiple (L.C.M.) and Highest Common Factor (H.C.F.) by division method.

iii) Problems involving H.C.F. and L.C.M.

iv) Algeraic operations involving brackets for common and decimal fractions.

v) Conversion of a common fraction into decimal fraction and vice-versa.

Unit-II Ratio and Proportion

i) Ratio and its application to inheritance and partnership.

ii) Introduction of direct proportion and its simple application.

iii) Continuation of unitary method.

iv) Use of ratio with unitary method as a special case.

Unit-III Averages.

i) Continuation of averages.

Unit-IV Algebra.

i) Algebra as generalised arithmetic-use of symbols for numbers.

ii) Algebraic expressions.

iii) Simple substitution in algebraic expressions and operations on them.

iv) Open sentences.

v) Examples of known arithmetical formulae/ expressed algebraically.

vi) Concept of constants and variables.

vii) Equalities and inequalities for expressions involving integers only.

Unit-V Geometry

i) Concept of point, line segment, ray and line, perpendicular to a line.

ii) Introduction of the units of measuring angles.

iii) Measurement of angles.

iv) Construction of an angle by using protractor.

v) Congruence of angles.

vi) Types of angles.

vii) Types of triangles and quadrilaterals.

viii) Construction of a circle of given radius.

ix) Bisection of an angle.

x) Bisection of a line segment.

xi) Drawing the perpendicular to a line.

xii) Construction of angles of 60, 30, 120, 90, and 45 degrees.

xiii) Making angles congruent to a given angle (by compass)

xiv) Area of regions bounded by parallelograms and triangles, volume of cube and cuboid.

Unit-VI Graph

i) Reading a bar and a line graph (continued).

CLASS - VII

Unit-I Sets

i) Concept of a set.

ii) Elements of a set.

iii) Tabular and descriptive methods of writing sets.

iv) One-to-one correspondence in two sets, equivalent, non-equivalent sets. (Finite sets only)

v) Operations of union (U) intersection ( ) amd dofferemce pf twp sets/

vi) The null (empty) set and universal set.

vii) Complement of a set.

Unit-II Algebraic operations.

i) Problems involving fractions.

ii) Square root of natural numbers and fractions by factor method.

Unit-III Ratio and proportion.

i) Ratio and proportion (continued).

ii) Continued ratios.

Unit-IV Percentages.

i) Concept of percentage, profit and loss.

ii) Application of percentage in Zakat, commission, profit and loss in partnership.

Unit-V Algebra.

i) Simplification of algebraic expressions.

ii) Fundamental operations on algebraic expressions.

iii) Linear equations in one variable.

iv) Equivalent equations.

v) Solution of linear equations in one variable.

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i) Concept of parallelism.

ii) Complementary and supplementary angles

iii) Construction of regular pentagon, hexagon and octagen with the help of protractor/compass.

iv) Construction of a triangle with given data (excluding ambiguous cases).

v) Properties of parallelograms rectangles and squares.

vi) Construction of parallelograms rectangles and squares.

vii) Circumference of a circle.

viii) Area of a circular region.

ix) Surface area of a cylinder.

x) Volume of a cylinder.

xi) Problems pertaining to area of a rectangular region and volume of a cube.

Unit-VII Graphs.

i) Drawing a bar-graph, line-graph and diagram.

CLASS - VIII

Unit-I Sets.

1) Subsets.

2. Universal set.

3) Equality of sets.

4) Difference of two sets, complement of a set. (continued)

5) Continuation of union and intersection of two sets.

6) The power set.

Unit-II Real Numbers.

1) System of rational numbers.

2) Numeration system with base 2 and 5.

3) Operation on directed numbers.

Unit-III Algebraic operations

1) Square root by division method.

2) Conversion of numbers from decimal system of numbers in the system with base 2 and 5 and vice versa.

3) Addition, subtraction and multiplication of numbers in the systems with base 2 and 5.

4) Simplification of algebraic expressions involving brackets.

5) Formula for $(a \pm b)^2$, $(a + b)(a - b)$ and $(ax + b)(cx + d)$ and their applications.

6) Factors of expressions of the type $(ka \pm kb + kc)$, $(a \pm b)^2$, $(a^2 - b^2)$ and $ax^2 + bx + c$.

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i) Continuation of solutions of linear educations in one variable and their application to problems.

Unit-V Ratio and proportion.

i) Direct and inverse proportion (compound cases)

ii) Application of continued ratios, direct and inverse proportion.

Unit-VI Percentage.

Application of percentage in computation of growth, profit and loss, zakat and civic taxes.

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1) Pythagoras theorem (without formal proof) and its application.

2) Construction of a line parallel to a given line.

3) Dividing a line segment into congruent segments.

4) Dividing a line segment in a given ratio.

5) Construction of a quadrilateral from given data.

6) Area of triangular region by Hero's formula.

7) Area of regions bounded by quadrilateral.

8) Surface area of a cone.

9) Volume of a cone.

AIMS AND OBJECTIVES OF SCIENCE TEACHING PRIMARY LEVEL 1973

Science at the elementary stage be taught as an integrated course reflecting the essential unity of science as a whole to children who in real life experience their environment as a whole. It should aim at helping children to develop concepts of science through the discovery method and further bring them to an appreciation and understanding of their environment as a whole. The goal should be to bring the pupil to a stage where he takes delight in being involved in learning science and feels committed to continue its study.

Main Aims

Although the specific aims of teaching science at different levles of education vary, the main aims remain the same as outlined below:

1. To achieve a broad and genuine appreciation and understanding of different aspects of science.
2. To promote scientific literacy and provide scientific and technological manpower in the country,
3. To develop scientific approach in the young pupils so that they acquire ability to apply knowledge

gained towards a solution of their problems.

4. To provide opportunity to an individual to determine his interests and aptitudes in science as a vocation.

5. To improve the general economy of the country and raise the living standard of our people through application of science and technology.

General Objectives for Teaching Science at the Elementry Stage

i) To develop the spirit of inquiry and inquisitiveness.

ii) To help the child to understand his physical environment and the interrelationship that exists in nature

iii) To develop an ability to observe carefully and to report facts accurately and understandingly.

iv) To acquaint the children with the various subject areas of science and to integrate the broad subject matter areas of science so that the children can begin to see science in its total perspective.

v) To help children to acquire and apply knowledge and manipulative skills.

vi) To develop the scientific attitudes and aesthetic awareness.

vii) To develop the habit of critical thinking and to draw inferences from observataions

viii) To help children develop basic concepts of various disciplines of science.

CONTENTS OF COURSES

(CLASS-I (Age 5 +)

Living Things

1. Animals vary in their physical appearance.
2. Animals differ widely in their size.
3. Animals differ widely in their shape.
4. Animals differ in their movement pattern
5. Plants vary in their physical appearance.
6. Plants vary in their ralative size.
7. Plants vary in the shape of their leaves.
8. Plants have flowers of different size, shape and colour.

Matter and Energy

1. Material objects can be moved.
2. Motion can be slow as well as fast.

3. There are various sources of heat.
4. There are many uses of heat.
5. There are various sources of light.
6. Light sources are usually heat sources as well.
7. Light enables us to see things.

Earth and Universe

1. The sun, moon and stars are seen in the sky.
2. The sun is a source of heat and light.
3. Day and night are related to the rising and setting of the sun.
4. Morning, noon and evening are related to the position of the sun.
5. Weather changes by wind, rain and clounds.

CLASS-II (Age 6 +)

Living Things

1. Animals have different kinds of coats.
2. Animals differ in their living habits and habitats.
3. Animals differ in their eating habits.
4. Animals are useful in many ways.

5. Plants are different inshape and size or stem.
6. Plants have roots of different size and shape.
7. Plants have seeds of different kinds.
8. Plants are useful in many ways.

Matter and Energy

1. There are various material objects around us.
2. Material objects exist in three states - solids, liquids and gases.
3. Some objects are heavy, others are light.
4. A force is necessary to make things move and make the moving things stop.
5. Force is push and pull.
6. It takes greater force to move heavy objects than light ones.
7. Heat is produced by burning and rubbing things
8. Heat is screened off by the intervention of a suitable object.
9. More heat is obtained from a source at a shorter distance and less heat at a longer distance.
10. Light is also screened off by the intervention of an opaque object. Light passes through transparent object.
11. More light is obtained from a source at a shorter distance and less light at a longer distance.

12. a) Shadows are cast in opposite direction to the sun or source of light.
    b) Shadows of objects change in length during the day.
    c) Shape of shadows resembles the shape of objects.

Earth and Universe

1. The earth, the sun, the moon and the stars are all spherical bodies.
2. The earth has many surface features-mountains, valleys, hills, rivers, lakes, plains and oceans.
3. The moon appears in different phases during a month.
4. Idea of four directions is related to the rising and setting of the sun.
5. Difference in warmth during day and night and in sunny and shady places is related to the position of the sun.
6. There are four seasons in a year- winter, summer, spring, autumn.

CLASS -III (Age 7 +)

Living Things

1. Animals require food, water and air for living.
2. Animals have coats suitable to their environment.
3. Birds are alike in having two wings, two legs

and a body covering of feathers.

4. Insects are alike in having six legs, two feelers and three body parts - head, thorax and abdomen.
5. Mammals are alike in having hair on their bodies and in feeding milk to their young ones.
6. Most plants have roots, stems and leaves.
7. Most plants need soil, water, air and light for growth.
8. Flowers produce fruits and seeds.
9. Crops grow in different seasons.

Matter and Energy

1. Matter is anything that occupies space and has weight.
2. Matter exists in three states-solid, liquid, and gas.
3. Matter can be changed from one state to another state.
4. Water exists in nature in all the three states-- ice, water and vapour.
5. There are many sources of water.
6. Water is useful for human beings, animals and plants. (Essential for life)
7. Air is matter. It occupies space and has weight.
8. Air is essential for man, animals and plants.

9. Force of running water and moving air can move objects.
10. The force of human muscles, animals muscles, engines can be used to make things move.
11. Force of gravity pulls objects towards the eath.
12. Force of friction stops motion.
13. An object at rest tends to stay at rest and an object in motion tends to stay in motion unless some outside force is applied.
14. Things become hot when they are heated. Heat changes the temperature of a
15. Heat can change the state of matter.
16. Shadows are formed because light trevels in straight lines.
17. Light and heat are useful for human beings, animals and plants.

Earth and Universe

1. Most of the earth is covered with a thin layer of soil.
2. Surface soil contains rock particles, sand, clay and humus.
3. Rocks are of different colours, shapes and hardness.

4. The moon's surface has several features - plains, hills, craters and ridges.
5. The sun, moon and stars change position with time.
6. The sun, moon and stars all rise in the east and set in the west.
7. The stars are like our sun.
8. Stars do not appear as bright as the sun because they are situated at great distances.
9. Some stars are brighter than others.

CLASS-IV (Age 8 +)

Living Things

1. Living things are distinguished from non-living things on the basis of movement and growth.
2. Plants and animals are living things; they show movement and growth.
3. Animals are useful for us in many ways.
4. Plants are also useful for us in many ways.
5. Animals and plants provide food for us.
6. Living things are adapted to their environment.
7. Plants and animals are interdependent.
8. There is a great deal of interaction between living things and their environment.

Matter and Energy

1. Some substances (sugar, salt boric acid) dissolve in water.
2. Most substances dissolve more in hot water than in cold water.
3. Water evaporates from rivers, ponds, lakes and oceans into the air.
4. In the air water vapour forms clouds from which water falls to earth as rain, snow and hail (water cycle).
5. The atmosphere is an air blanket around the earth.
6. Air is made up of many gases - oxygen, nitrogen carbon dioxide, water vapour and other gases.
7. Oxygen is a gas that supports life and combustion.
8. Burning of a candle and breathing are similar processes because:
   a) Oxygen is used up in both processes.
   b) Carbon dioxide is produced in both processes.
   c) Water vapour is produced in both processes.
   d) Heat is produced in both processes.
9. Air-pollution is due to smoke particles and gases from chimneys and smoky vehicles.

10. Hot air rises up and cold air moves in to take its place.
11. Proper ventilation is a necessity wherever human beings live and work in homes, in offices, in factories, in mines in public halls.
12. Magnets help move certain things.
13. Magnets have two poles.
14. There are two kinds of magnetic poles. A freely suspended magnet will always be in North-South direction.
15. In magnets the magnetic force is stronger at the poles.
16. Like poles of two magnets repel each other: and unlike poles attract each other.
17. There are many uses of magnets.
18. Electricity also helps move certain things.
19. Electricity is produced in certain things by rubbing.
20. There are two kinds of electric charge.
21. Similar charges repel and dissimilar charges attract.
22. Some things may be cold, other may be hot.
23. Degree of hotness of an object is its temperature.
24. Thermometers are used to determine temperature.

25. Temperature is measured usually on two scales; Celsius and Fahrenheit.
26. Water boils at about 100°C (212°F)
27. Ice melts at 0°C (32°F).
28. The normal temperature of human body is about 37°C (98½°F).
29. Light bounces off when it strikes objects. This is called reflection.
30. When light is reflected it changes its direction but it still travels in a straight line.
31. We can see things when light is either emitted by them or reflected from their surfaces.
32. The moon is a non-luminous body. Moonlight is reflected sunlight.
33. Sunlight consists of seven colours.

Earth and Universe

1. The earth rotates on its axis.
2. Day and night are caused by the rotation of the earth.
3. The sun, moon and stars rise in the east and set in the west due to the rotation of the earth.
4. The sun rises in the east at different positions

during different seasons.

5. The pole star does not change its position with time. It is the only star that seems fixed.
6. The constellation, "Big Bear", seems to move round the pole star.
7. 'Pointers' of the Big Bear indicate the location of the pole star.
8. The direction of the pole star is the direction of north.

CLASS-V (Age 9 +)

Living Things

1. Animals come from pre-existing parents and grow to be like their parents.
2. Some animals (hen, frog, fish) are hatched.
3. Some animals are born.
4. Some animals - insects- pass through stages of structural change before maturity is reached.
5. Some baby animals that cannot move competently are fed and protected by their parents.
6. Most plants grow from seeds.
7. Inside the seed is a baby plant which grows into a new plant of the same.
8. Plants pass through a cycle from seed to seed.
9. Seeds are dispersed in many ways.
10. Some plants grow from bulbs.

11. Some plants grow from parts of stems and leaves.
12. Plants need manure and fertilizers, for proper growth (special emphasis on crops).
13. Different crops are cultivated in different ways.
14. We use different foods (cereals, meat, egg, fish, vegetables and fruit).
15. The proper proportion of different types of food constitutes balanced diet.
16. A balanced diet is important for maintaining proper health.
17. Sickness is caused by unhygienic food and unhygienic living conditions.
18. Hygienic habits are necessary for healthy living.

Matter and Energy

1. Matter is made up of atoms. Different types of matter have different kinds of atoms.
2. Atoms can join together to form molecules.
3. The freedom with which the molecules of substances can move determines its state (kinetic molecular explannation of three states)
4. Water keeps its level due to gravitational force.

5. The water supply system makes use of flow of water under gravity.
6. Rain water picks up dust and microbes from the air.
7. Some minerals from the soil dissolve in water; mud, sand particiles, dead organic matter and microbes found in plant and animal wastes collect in water as suspended impurities.
8. Some of the impurities in water are harmless, whereas others can be very harmful.
   a) Small amounts of minerals and gases in water make it taste better. It would taste flat without them.
   b) Many microbes are very harmful and these must be removed or killed before water is made suitable for drinking.
9. In the home, water can be purified by boiling which kills microbes, and by filtration through linen which removes suspended impurities.
10. For the supply of drinking water to towns and cities water is purified by large filter plants.
11. Aeration and chemicals are used to kill microbes.
12. Waste materials from factories and untreated wastes and severage from cities pollute water.
13. Water vapours in air give rise to clouds, rains hail and snow. There are many types of clouds.

14. Difference of temperatue gives rise to wind storms.
15. Levers make it easier for us to move things.
16. Wheels help us in moving things.
17. Pulleys make it easier to lift things.
18. Inclined planes help us in moving things.
19. Wedges help us in moving things.
20. Levers, wheels, pulleys, inclined planes and wedges are simple machines.
21. Changes are due to energy.
22. There are different forms of energy - mechanical energy, heat energy, light energy, electrical energy, atomic energy.
23. Heat energy produces some changes - change of temperature, change of state and change of volume (kinetic molecular explanation).
24. Heat energy is produced in burning.
25. Three things are needed for burning to take place: fuel, oxygen and proper temperature.
26. To put out a fire we must take away one or more of the three things needed to make a fire.
27. Transparent materials allow most of the light striking them to pass through. Translucent materials allow some light to pass through and some light to be absorbed.

28. Opaque objects do not allow any light to pass through them, but absorb and reflect the light instead.
29. A material appears coloured because when light strikes the material all the coloured lights are absorbed except the one which is relfected to the eye.
30. A magnet can attract certain materials (magnetic materials) such as iron, cobalt nickel.
31. A magnetic material can be magnetised in many ways.
32. Magnets lose their magnetism by dropping, striking or heating.
33. Matter has two kinds of charges.
34. We can distinguish one kind of charge by rubbing two different kind of material.
35. Negative charge is due to electrons.
36. Positive charge is due to deficit of electrons.
37. Sound is a form of energy that is caused by vibrating bodies.
38. Sound is reflected when it strikes a hard surface.
39. An echo is produced when sound is reflected from a distant hard surface.

Earth and Universe

1. The sun is a star. It is much larger than

the earth.

2. The sun is very far away from the earth.
3. The sun and its nine planets make up the solar system.
4. Planets are non-luminous bodies.
5. Some planets have satellites - moons - circling around them.
6. The earth's surface is constantly changing due to weathering.
7. Weathering is caused by the action of sun, wind and water.
8. The process of taking away the products of weathering (erosion) is carried out by water, ice, and wind.
9. It is necessary to adopt measures for preventing erosion to conserve the soil.
10. Oceans cover 3/4 of the earth's surface.
11. The crust of the earth is thinner under the floor of the ocean than under land area.
12. The three main parts of the ocean floor are: the continental shelf, the continental slope and the basin.
13. Oceans are large reservoirs of food.

AIMS AND OBJECTIVES OF TEACHING SCIENCE AT MIDDLE STAGE

Science at the middle stage should be taught as an integrated course, reflecting the essential unity of science as a whole, and involve real life, experiences mostly drawn from their environment. It should aim at helping student to develop concepts of science through the discovery method and further bring them to an appreciation and understanding of their environment as a whole. The goal should be to bring the pupil to a stage where he takes delight in being involved in learning science and feels committed to continue its study.

General Objectives

Although the specific aims of teaching science at different levels of education very, the main aims remain the same. They are as outlined below:

1. To achieve a broad and genuine appreciation and understanding of different aspects of science.
2. To promote scientific literacy and provide scientific and technological manpower in the country.
3. To develop scientific approach in the young pupils so that they acquire ability to apply, knowledge gained towards a solution of societal problems.
4. To provide opportunity to an individual to determine his interests and aptitudes in science as a vocation.
5. To improve the general economy of the country and raise the living standard of our people through application of science and technology.

Specific Objectives for Teaching Science in the middle stage

i) To develop the spirit of inquiry and inquisitiveness.

ii) To help the child to understand his physical environment and the interrelationship that exists in nature.

iii) To develop an ability to observe carefully and to report facts accurately and with understand.

iv) To acquaint children with the various subject areas of science and to integrate the broad subject matter areas of science so that the children can begin to see science in its total perspective.

v) To help children to acquire and apply knowledge and manipulative skills.

vi) To develop the scientific attitudes and aesthetic awareness.

vii) To develop ;the habit of critical thinking and to draw inferences from observations.

viii) To help children develop basic concepts of various disciplines of science.

CONTENTS OF SCIENCE AT MIDDLE LEVEL

CLASS - VI

LIVING THINGS

1. CHARACTERISTICS OF LIVING ORGANISMS

Living things are distinguished from non-living things on the basis of movement, nutrition, growth, respiration and reproduction.

- Animals and plants try to protect themselves from their enemies.

3. CLASSIFICATION OF LIVING ORGANSMS

- Living things can be divided into plants and animals.
- Animals and plants can be divided on the basis of habitats as acquatic and terrestrial.
- Animals can be divided into two groups: Invertebrates and vertebrates.
- Plants are classified as flowering and non-flowering.

4. MICRO-ORGANISMS

- Some living things, both animals and plants, are called microbes.
- Some microbes are useful and some are harmful for living things.

- Some microbes have caused epidemics that have destroyed large human populations.
- Microbes can be destroyed by various means.
- Control of disease-microbes has reduced diseases and death of living things.

MATTER AND ENERGY

5. State of Matter

- All molecules of a substance are alike but the molecules of one substance differ from another.
- Molecules of a substance attract each other, the further apart they are the less they attract each other.
- Solids have definite volume and shape because of strong inter molecular attraction.
- Liquids have a definite volume but do not have a definite shape because of weak inter molecular attraction.
- Gases do not have either definite volume or definate shape because of very small inter molecular attraction.

6. Effects of Heat on Matter

- Solids, liquids and gases expand an heating and contract on cooling.
- Expansion and contraction of substances are of great importance in our daily life.

- When heat energy is supplied to a substances its molecules move faster and spread further apart so that the substance expands.
- When a substance is cooled the molecules move more slowly and come closer togeth-r so that the substance contracts.
- When enought heat is supplied to a solid, the molecules move faster and faster and finally break away and move about freely and thus solid changes into a liquid;
- When enough heat energy is supplied to a liquid molecules move away far a part and a liquid becomes a gas.

7. Atmospheric Pressure

- Atmosphere exerts pressure.
- Barometers are used to measure atmospheric pressure, moving air gives rise to decrease in pressure.

8. Action - Reaction

- Force is an inter-action between two material object.
- Force can change the position of material object.

- Force can also act at a distance.
- During inter-action of two material bodies the action and reaction forces are equal and opposite.
- The reaction force help to move certain things such as aeroplane, jets, rockets, boats and ships.

9. Reflection of Light

- When a ray of light strikes a surface, it is reflected back making an angle of reflection equal to the angle of incidence.
- An image is seen in a plain mirror because almost all the light striking its surface is feflected.
- An image in a plane mirror is as far behind the mirror as the object is in front of it.
- The image in a plane mirror is as large as the object.
- The image in a plane mirror is laterally inverted.
- Reflection is regular from a smooth surface and irregular from a rough surface.
- Irregular reflection is used for indirect lighting and to avoid glare.

10. Electro-Statics

- An Atom contains electrically charged particles called electrons and protons, electrons are negatively charged while protons are positvely charged.
- When an object becomes electrically charged it either loses or gains electrons.
- Similar charges repel each other and opposite charges attract each other.
- Electric charge can be detected and distinguished by an electro-scope.
- Some materials allow electrons to move or flow easily through them. These materials are called conductors.
- Other materials will not let electrons flow easily through them. These materials are called non-conductors or insulators.
- Electrons can jump from one object to another thus producing sparks.
- Lightning conductors are used to protect buildings from damage by ligtening.

11. Current Electricity

- Electric current is the flow of electrons through conductors.

- A closed electric circuit is formed by connecting a source of electricity, a conductor and an appliance.
- An open circuit is formed, when any of these parts of a circuit is disconnected so that a current is not flowing.
- Switches are devices that make it easy and convenient to close or open an electric circuit.
- Fuses are safety devices used to prevent the wires from becoming too hot when an overload takes place.

12. Magnets

- The force of magnet is felt in the space around a magnet. This space is called a magnetic field.
- The magnetic field is represented by the magnetic lines of force.
- The magnetic force can act through non-magnetic materials but not through magnetic materials.
- A soft iron bar placed inside a current carrying coil becomes a magnet. It is called an electro-magnet.

- An electro-magnet loses its magnetism when the current in the coil is turned off.
- The strength of electro-magnet increases with the increase in the number of turns of the coil and also with the increase of the current passing through it.
- Electro-magnets are used in electric bells and many other devices.

EARTH AND UNIVERSE

13. Interior of the Earth

- The earth is a spherical body having a radius of about 6400 km. It is made up of three separate layers, the crust, the mantle and the core.
  - i) The crust is the outer most layer of earth which varies in thickness (7-70 km) at different places.
  - ii) Beneath the earth's crust is the mantle which goes down to a depth of about 2900 km.
  - iii) Inside the earth's mantle is the core having a radius of about 3540 km.

14. The Sun

- The sun is one of the billions of stars that

make up the univers.

- The sun is at a distance of about 148,000,000 km from the earth.
- The sun is a very hot body. It sends out radiant energy in all directions.
- Only a very small part of sun's energy reaches the earth.

15. The Moon

- The moon revolves round the earth in an elliptic orbit. The moon's average distance from the earth is 384,400 km.
- Different phases of moon are caused dur to moon's revolution round the earth.
- The moon has no atmoshpere and no water.
- The moon is ellipsed when it passes through the earth and its shadow falls on the sun, when the earth comes between the sun and the moon.
- The moon has no light of its own.
- The sun eclipse is caused when the moon, passing between the sun and the earth, outs off sunlight.

16. Soil

- The forces of watheringhave acted on rocks on or near the earth's surface and have broken these rocks.

- Soil is made up of tiny grains of rock produced through continuous effect of weathering for millions of year.
- There are three major components of soil, sand, silt and clay. The composition varies from place to place.
- A fertile soil contain humus.
- Soil can be made more fertile by the addition of chemical fertilizers.

17. Oceans

- The average depth of the ocean floor is about 4 km.
- At some places the ocean is over 11 km deep.
- The ocean floor is not smooth. It contains many mountains and valleys.
- Sea water has a large amount of common salt and minerals dissolved into it.
- Common salt is also obtained by the evaporation of sea water.
- Salt and minerals are, since long, being carried to the ocean by river and streams.

CLASS VII

LIVING THINGS

1. Structure of Plants

A Plant body consists of root, and shoot.

- The roots are usually the underground parts of plants.
- The roots form a system.
- The roots give support to the plants, and absorb water and minerals from the soil.
- Thee exposed part of the plant is the shoot and consists of stem, leef etc.
- Stems bear leaves and flowers.
- Mostly the green parts of plants are leaves.
- Leaves manufacture food.
- The flowers consist of 4 parts, sepals, petals, stamens and carpels.
- Sepals protect the flower.
- Petals are brightly coloured to attract insects, etc.
- Stamens and Carpels are male and female reproductive organs of flower.

2. Structure of Animals

- The body of an animal is usually divided into head and trunk.
- The appendages of trunk region are called limbs.
- The body of man contains a number of systems i.e. Digestive system, Respiratory, Circulatory, Excretory, Nervous skeblal system etc.

3. Food and Nutrition

- Food is a source of energy
- Proteins, Carbohydrates, Fats, Vitamins, Minerals, and Water are essential nutrients for growth.
- Green plants are producers of food and animals are consumers of food.
- Surplus food produced in the plant is stored in various parts of plant.
- The potential energy of food is passed from organism to organism in a food chain.
- The number of food consumers depends upon the number of producers.

4. Factors Governing Survival

- Living organisms require suitable amount of water and food for their existance.
- Living organisms must have adequate space and place to live.
- Light and air are essential for life.
- Living organisms must be protected against enemies and disease.

MATTER AND ENERGY

1. PHYSICAL AND CHEMICAL PROPERTIES OF MATTER

- Material objects can be distinguished on the basis of their properties - physical and chemical.
- Change in matter go on all-around us. Changes may be physical or chemical.
- A physical change involves changes in physical properties but the composition remains the same.
- In the chemical change a new material is formed with properties that are different from the original material.

2. ENERGY

- Changes are du to energy.
- Forms of energy: (i) Kinetic and

potential energy.

(ii) Heat, light sound, chemical, mechanical energy and nuclear.

3. HEAT ENERGY

- Heat is the energy caused by molecular motion.
- Average kinitic energy of the molecules of a body determines its temperature.
- Scales of measuring temperature:
  i) Celsius Scale
  ii) Fahrenheit Scale.
- Thermometers are used to measure the temperature.
- Types of thermometers;
  i) Clinical Thermometer.
  ii) Maximum and Minimum Thermometer.
- Interconversion of temperature scales. (Centigrade and Fahrenheit).

4. WEATHER

- Weather at a particular time and place depends on the following factors:
  i) Amount of moisture in the air (humidity).

ii) Temperature of the air.

iii) Air pressure.

iv) Direction and speed of the wind.

- The presence of moisture in the air is due to the process of evaporation.
- The rate of evaporation depends upon the following factors:

i) Area of the liquid surface.

ii) Temperature.

iii) Speed of wind.

iv) Humidity.

- Evaporation produces cooling.
- Perspiration in animals and transpiration in plants are processes that control body temperature through cooling due to evaporation.
- Humidity depends upon the amount of moisture in the air as well as its temperature.

5. REFRACTION OF LIGHT

- When light passes from one medium to another medium its path bends, this bending of path of light is called 'refraction'
- Refraction produces many effects.
- Dispersion of light.

- Dispersion produces many effects e.g. formation of rain-bow.
- Any coloured transparent material looks coloured because it allows only one coloured light to pass through and absorbs all the rest.
- Red, green, blue are called primary colours of light.
- All three primary coloured lights mixed together in proper proportion produce white light.
- Any two colours which produce white light when mixed, are called compelemtary colours.
- Mixing of coloured paints produces effects different from those produced by coloured light.
- Red, yellow and blue are primary colours of paints because otehr colours can be produced by mixing different proportion of these coloured paints.

6. MACHINES

- Machines are devices that make work easier.
- There are six simple machines:
  a) lever (b) wheel and axle (c) pulley
  d) inclined plane (e) wedge (f) screw
- All machines are made up of one or more simple machines.

- Friction impedes motion.
- Lubrication reduces friction.
- Rollers, wheel and ball bearings also reduce friction.

7. CURRENT ELECTRICITY

- Electricity can be used to produce: i) heat (ii) light (iii) motion.
- Series and parallel circuits.
- Advantages and dis-advantages of series and parallel circuits.
- Safety rules to be observed when electric appliances are used.

EARTH AND UNIVERSE

1. Rocks

- The solid part of the earth's crust is made up of great masses of hard material called rock.
- Rocks are made up of one or more minerals, or chemical elements and compounds that are formed naturally in earth's crust.
- Rocks are divided into three main groups according to the wy way in which they are formed. The three kinds of rocks are: Igneous,

sedimentary and metamorphic.

i) Igneous rocks are formed from molten material in or below the earth's crust, e.g. granite.

ii) Sedimentary rocks were formed from different sediments that accumulated for several thousand years and were cemented tightly together under sea, e.g. sand stone.

iii) Metamorphic rocks are igneous and sedimentary rocks that were burried deeply under other rocks and then changed by heat and pressure. Marble is an example of metamorphic rock.

2. Ground Water

- Water from rain, snow and ice seeps into the ground until it is stopped by a non-porous layer of rock.
- This water is called ground water.
- The upper level of the ground water in the soaked soil and rock is called the water-table.
- Ground-water collects in wells and lakes or gushes out as springs.

3. Seasons

- The earth revolves in an elliptic orbit around the sun during about 365¼ days.
- The earth's axis is tilted at an angle of 23½ degrees and is pointed towards the pole star.
- Because of this tilt and because of the earth's revolution around the sun, the earth has different seasons.
- Growth and activity of living things change with seasons.

4. Sun's Energy

- The surface temperature of the sun is about 6000 degrees centigrade.
- The sun is the principal source of energy on earth.

5. Solar System

- The solar system is made up of a group of heavenly bodies that move around the sun in alliptic paths.
- The principal members of the solar system are nine large bodies called the planets. The names of planets, in order of thier

increasing distance from the sun are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Urenus, Neptune and Pluto.

- Between Mars and Jupiter, there is a belt of several thousand smaller bodies, called Asteroids, which also move around the sun.
- Planets are not stars althrough they shine in the sky.

  i) Stars shine because they give off light but planets shine because they reflect the light of the sun.

  ii) Planets are much smaller than the sun or the stars.
- Planets rotate as they travel around the sun.
- Many of the planets have their own satellites that revolve around them.

CLASS VIII

LIVING THINGS

1. CELLULAS STRUCTURE OF LIVING THINGS

- Cells is a unit of structure and function.
- A cell consists of cell-membrane, cytoplasm, and nucleus.
- The cells of plants and animals are different from each other in some respects.

2. CELLS AND ORGANISM

- Some organism consist of single cells only (example amoeba)
- Large organisms are multicellulas,
- Groups of similar cells are called tissues.
- Various tissues join togather to form an organ which performs a definte function.
- Various organs performing complementary functions are linked to form a system.
- Various systems are grouped together in an organised whole called organisms.

3. REPRODUCTION IN ORGANISMS

- Animals and Plants can reproduce asexually and sexually.

- In asexual reproduction sex-cells are not involved.
- Sexual reproduction takes place by the union of male and female sex-cells.
- The transfer of male sex cells in plants to female part of the flower is known as pollination.
- The union of male and female sex cells is called fertilization.
- The fertilized cell in plants grows to form seed.
- Seed germinates to produce a new plant.
- The male and the females are usually separate in animals.
- Male and female animals unite to transmit the male sex cell into the body of female.
- In fertilisationm male and female cells fuse together to produce fertilized egg.
- The fertilized egg grows to form an embroyo.
- Embroyo grows into ne animal.

MATTER AND ENERGY

4. Structure of Atom

- Atoms are made of three particles called electrons protons and neutrons.

- Protons and neutrons are packed together in the nucleus at the centre of the atom.
- Structure of atom is represented by the Bohr Model and the Electron Clound model.
- Different kinds of atoms differ in the number of electrons, protons and neutrons.

5. Elements Mixtures and Compounds

- An element contains same kind of atoms.
- There are over hundred different kinds of elements.
- Elements are divided into two main groups called metals and non-metals.
- An element is represented by a symbol.
- All the material objects can be divided into three main classes: elements, compounds and mixtures.
- Two or more than two elements combine to produce a compounds.
- The compound has different chemical properties than the constituent elements.
- A compound is represented by a chemical formula.
- A chemical change is represented by a chemical equation.

of solvent at a given temperature.

- Some compounds form ions in solution and allow electricity to pass through them. These are called electrolytes.
- Electrolytes are acids, bases and salts.

7. Oxygen and Carbondioxide Gas

- Oxygen gas is prepared from compounds containing oxygen.
- Physical and chemical properties and uses of oxygen gas.
- Carbondioxide gas is prepared by the action of acids and carbonates.

- Physical and chemical properties and uses of carbondioxide.

8. Heat Energy

- Heat energy is tranmitted in three modes- conduction, convection and rediation.
- In conduction heat energy is passed from molecules to molecule by collision.
- (i) Materials can be conductors or insulators.
- Metals are good conductors of heat.
- There are many uses of good conductors and insulators in our daily life.
- (i) In convection heat energy is carried by displacement of molecules.
  (ii) Convection takes place in gases and liquids.
  (iii) Convection causes convection currents in liquids and gases.
- In radiation energy is conveyed directly from one place to another even in vaccum.
- Conduction, convection and radiation are prevented to great-extent in a Vacuum flask.

- Images are formed by spherical mirror.
- Light can be refracted by lenses. Lenses are of two types: Concave and convex.
- Paralell rays after passing through a convex lens converge at a point called the focus of the lens.
- A concave lens diverges the rays of light passing through it.
- Images can be formed by lenses. The distance of the image/depends on the distance of object from the lense.
- Spherical mirrors and lenses are used in many optical instruments such as telescope, microscope, camera, projector etc.

- Camera and the eye are similar in their parts and functions.

10. Current Electricity

- Electricity is a form of energy and can be produced from other forms of energy.
- Electricity can be produced from chemical energy-voltaic cell and Dry Cell.
- Electricity can be produced by light.
- Electricity can be produced by heat.
- Electricity can be produced from mechanical energy.
- Electricity can be produced from nuclear energy.

11. Sound

- Sound is a form of energy that is caused by vibrating bodies.
- Sound waves can travel through a solid, liquid or a gaseous medium but they can not travel through vaccum.
- Sounds differ in three characteristics- pitch, intensity and quality (simple treatment).

- Sound travels in the form of waves.
- An echo is a sound wave reflected from a distant large hard surface.
- The ear receives sound waves and transmits them to the brain which gives us the sensation of sound.

EARTH AND UNIVERSE

12. Movements in Earth's Crust

- The continental parts of earth can move and have moved at different times. Formation of continents could have taken place from the breaking up of a single land mass and a subsequent drift of its parts.
- Because of great temperature and pressure, tremendous sideward forces act on horizontal layers of rock, making them bend and wrinkle and pushing them into wavelike folds.
- Some times, in the process of folding, the rock may crack or break rather than bend. The crack or break in the rock, when accompanied by some differential movement, is called a fault.

- Earthquakes happen when fauting, and some time folding, take place.
- Mountains are great masses of rock produced by the forces inside the earth.

13. Revolution of satellites and planets

- The planets revolve around the sun due to two factors, gravitational force and velocity.
- Satellites also revolve around the planets due to gravitational force and velocity.
- Artificial Satellites revolve in orbit due to their velocity and the force of gravity.

14. Artificial Satellite

- Artificial Satellite can be put in orbits around planets.

15. Comets and Meteors.

- In the solar system there are also bodies, called comets, which have long elliptic orbits that bring the comets very close to the

sun and then far out into the solar system.

- The comet has a head and a tail which shines. The tail always points away from the sun.
- In the solar system there arealso billions of fast moving rock of various sizes, called meteors.
- When a meteor enters the earth's atmosphere, the friction of air rubbing against the meteor makes it white hot and it burns out. Some of these meteors reach the earth, these are called meteorites.

16. Stars and Galaxies

- Stars are suns in space and they produce their own light.
- Stars are divided into various groups, called constellations, which make it easier to identify them.
- Billions of stars are organized in a huge system called a glaxy. Distant glaxies appear as bulbs of light on the sky.
- The universe is made up of millions of galaxies, at great distances from one another.

17. Mineral resources of Pakistan

- Minerals occur as deposits in the earth and are usually associated with other materials.
- Minerals constitute an important natural resource of Pakistan.
- Account of important minerals found in Pakistan and their uses.

6. LIST OF EXPERIMENTS

No convential experiments are recommended. The 'activities' developed in the textbook will be performed in the classroom.

7. TEACHER DEMONSTRATIONS

The teacher demonstrations will be developed alongwith the textbook and Teacher's Guides.

7 (a) EQUIPMENT

It is proposed that Teaching Kit for Classes VI-VIII be developed by the National Educational Equipment Centre, Lahore.

Annex-IV

ELEMENTARY SOCIAL STUDIES CURRICULUM

FOR

CLASSES I - V

RECENT POSITION OF THE SUBJECT

The name of Social Studies was first of all given to a group of subjects History, Geography and Civics, by the Punjab University Commission, 1950-52 when it included this subject in the list of elective subjects. Its recommendations did not materialise, however schools went on teaching the age-long subjects called History and Geography with practically the same content which British handed down to us.

However in 1959, the Board of Intermediate and Secondary Education, Lahore, made a departure by branding the subject of History and Geography as Social Studies and making it compulsory to pass. Peshawar introduced the new scheme which included Social Studies as a subject in 1959. Karachi University and then the Board of Intermediate and Secondary Education, introduced the new syllabi throughout Pakistan in 1962, with the following objectives.

1. To create the ability to appreciate and understand economic, political and other problems.
2. To develop the consciousness of one's social obligations and duties as well as right.
3. To develop the ability to think, feel and act as a useful and loyal citizen.
4. To foster patriotism and respect for the established values of the life and developing the appreciation of cultural and national heritage.

5. To create a due regard for personal and public property.

OBJECTIVES OF TEACHING SOCIAL STUDIES IN PAKISTAN

Objectives of teaching a subject depends upon the national objectives of Education which ultimately depends upon the objectives of the country. Before, enumerating the objectives of teaching Social Studies in Pakistan it is worth while to have cognizance of the objectives of teaching Social Studies in some of the countries of the world.

Since the last decade of nineteeth century, when Social Studies got a place in the curriculum, objectives defined by the virious committees can be summarized. The aim of General education in developed countries is to help young people learn to carry on the society they have inherited; to make whatever changes modern conditions demand or creative imagination suggests that are consistent with its basic principles and values and to pass it on to their off-springs better than they receive.

Social Studies in developed countries is more devoted to education for citizenship education than any other fields. Hence many objectives of citizenship education constitute objectives of the Social Studies-objectives of self-realization, Economic Efficiency, Human Relationship and Civic Responsibility.

SPECIFIC OBJECTIVES

The main objective of the Social Studies Programme is to provide opportunities for a continuous development of children towards self actualization and social competence. The programme is intended to develop the following:-

1. Affective

a) A deep and abiding love for Pakistan and its basic ideology with special reference to Islamic values of economic equality and social justice.

b) An appreciation and transmission of the cultural heritage of Pakistan.

c) An appreciation of loyalty to democratic values.

d) A realization of the importance of mutual cooperation and inter-relationship of man and his physical and social environment.

e) An appreciation of the inter-dependence of nations leading to world understanding.

f) A recognition of the importance of natural resources and their conservation and proper utilization, through human endeavour and use of modern teachniques.

2, Cognitive

a) A gradually expanding acquaintance with the surroundings.

b) An acquaintance with the teachings of Islam and achievements of the great personalities of Pakistan with special reference to freedom movement.

c) Knowledge of the duties toward Allah, the Almighty,. Knowledge of the duties towards fellow human-beings.

d) An understanding of the rights, duties and responsibilities as a member of the family, the community and the society.

e) An elementary knowledge of the interaction of the physical conditions and the life and activities of man.

f) Knowledge of the socio-economic and political affairs related to national and International levels.

g) Knowledge of the ideology of Pakistan Movement.

3. Psycho-motor

a) Skills in establishing human relations, such as cooperation, co-existence, consideration and tolerance for others.

b) An ability to seek, organize, interprent, present information and make decisions.

c) Development of observation, classification, discrimination of judgement.

d) Development of independent and critical thinking.

e) Adjustability to social environment and developing the sense of national cohesion,

f) Make and use of materials such as maps, graphs, tables, globes, charts, pictures, models etc.

CURRICULUM - CLASS I TO V

1. The curriculum for Primary classes has been designed in such a way that a child proceeds from 'known to unknown' and from 'concrete to abstract'. It starts with 'Home' and ends with 'the world'.

2. It presents an integrated approach.

3. The curriculum revolves round the child. Whatever he studies, he feels himself 'there'.

4. The concentric circles have been drawn in such a way that the inner circle is for class I and topics for studies relate to child's home, mohallah and school, the second one for class II which deals with his village/city, the third circle for class III concentrates on his district, for Class IV, the focus of the study is province, and finally the bigger circle for Class V which envelopes Pakistan in Islamic countries and the world.

5. The topics in each class relate to the history, location, people natural and their relations, administration, means of communications and transportstion, resources, products, occupations, problems and their solutions, works of public, welfare, duties and rights, and important personalities of a particular 'circle' of the curriculum.

6. Efforts have been made to point out the 'values' which are to be inculcated among the students while dealing with the particular topic.

7. The syllabi have been designed keeping in view the needs of the students, so that it fits for those who intend to continue their studies as well as, for those who are unable to join the sixth class.

The whole curriculum has been divided into units, objectives, concepts, contents, methods, activities and evaluation, processes of each unit are given.

CURRICULUM OF SOCIAL STUDIES FOR CLASS (VI-VIII).

DOMAINS OF KNOWLEDGE.

COGNITIVE:

1. Knowledge of the Ideology of Pakistan.
2. Knowledge of the struggle for Freedom and Establishment of Pakistan.
3. Knowledge of Islamic code of personal and social life.
4. Knowledge of the contribution of Provincial leaders.
5. Knowledge of the achievements of after the birth of Pakistan.
6. Knowledge of the Natural resources, and their developments.
7. Knowledge of the Natural environments and their effects on human life.
8. Knowledge about the Welfare agencies of the society.
9. Understanding the rights, duties and responsibilities as a member of the society.
10. Knowledge of the personnel, social and economic conditions of Pakistan.
11. Understanding the basic Psychological and social needs of an individual.

12. Knowledge of the ways and means of acquiring information and data.

13. Comparative knowledge of the mode of living in other countries,

14. Knowledge of importance of interdependence of nations.

15. Knowledge of Pakistan in the Sub-continent.

16. Knowledge of trade of Pakistan with other countries.

EFFECTIVE:

1. Attitude to respect Islamic way of life.

2. Appreciation of the Pakistan Movement.

3. Appreciation for and pride in our cultural heritage.

4. Appreciation for the reliable sources of information.

5. Appreciation for the development of Pakistan.

6. Appreciation for national resources.

7. Attitude of cooperation in nation building activities.

8. Appreciation of the independence of national and international Brotherhood.

9. Appreciation for dignity of labour.

10. Respect for individual differences.

11. Acceptance of one's limitations.

12. Appreciation for made of living of the people of other countries.

13. Love for humanity lands.

PSYCHO MOTOR

1. Activities to promote Islamic values.

2. Skills for organizing ideas and statements.

3. Ability to solve problems.

4. Activities for preserving our private and public property.

5. Skill in establishing human relations, cooperation, co-existence and tolerance.

6. Ability to seek, organize, interpret, present information and make prediction.

7. Participation in experiments and projects.

8. Participation in activities designed for national cohesion.

9. Participation in activities to explore and exploit National Resources.

10. Ability to use materials maps, graphs and charts.

11. Participating in group activities.

12. Performing goals of leadership.

13. Meeting other people.

14. Observing National International Days.

BASIC LEVEL (Grade III) CARPENTER (1 Year).

Knowledge Requirements:

1. Safety precautions applicable to power wood working tools and machine.
2. Good housekeeping-care and maintenance of tools and equipment.
3. How to read and interpret simple plans, drawings and sketches.
4. The types of timbers in common use and the standard method of classification of sizes.
5. The types of screws; nails and corrugated sheets commonly used in the trades.
6. The types of saws and the methods of sharpening and setting.
7. The types of timber connectors and their uses.
8. The methods and the reasons for seasoning timber.
9. The reasons for treating and storing timber.
10. The uses of glue.
11. The different types of joints and their preparation.
12. How to prepare animal and synthetic glues.
13. The methods of making smoth finish surfaces.
14. The operations and uses of various types of woodworking.
15. The types of timber doors, windows and window leaves.
16. The methods and constructions of plain built-in furniture.
17. The types of timber staircases and the methods of construction.
18. The reasons for using moulding, skirting, panelling and picture rails.

19. The main types of laminated ply and adhesive used in woodworking.

20. The types of hardwood covering for floor in common.

21. The various methods of laying wooden floor and the defects.

22. The basic knowledge of polishes, varnishes and paints for wood.

23. The types of hinges fixtures and tower bolts commonly used in the trade.

24. The different types of simple timber roof construction.

25. The types of wooden walls, ceilings and partitions for buildings.

26. The common methods of constructing simple doors, windows, door and window frames.

27. The types and methods of constructing floor boards and joints.

28. The basic terms commonly used in the building trade.

29. The care and maintenance of woodworking machines listed in the performance items.

30. How to match the colour and grain of the timber to obtain a good finish.

31. The various types of ploishes and varnishes used in wood finighing.

BASIC LEVEL-GRADE III (Note: Common to light and Heavy Motor Vehicle Mechanic/Auto Mechanic and Tractor Mechanic.)

Knowledge: Requirements.

1. The General safety precautions in the motor vehicle repair shop, including safety in the use of flammable, tools and equipment. Good house keeping including cleanliness and tidiness in the workshop and correct working habits. Recognition of general workshop tools.

2. Basic mathematics and Urdu/or English comprehension and writing related to the work in the basic level motor vehicle mechanic (Light & Heavy) and tractor mechanic.

3. The application of various types of locking devices, e.g. threads, split pin, spring washers, etc.

4. The general layout and reading of drawings, shotches of motor vehicles, motor cycles, scooters, tractor including compact and conventional construction, Front and rear driven.

5. The basic principle of operation of I.C. Engines. Difference between two and four stroke engines. Principle and basic function of sub and major assemblies of motor vehicle and tractor.

6. The purpose and principle of operation of cooling systems.

7. The purpose and principle of operation of various braking systems in common use. The purpose and principle of operation of fuel and lubrication systems.

8. The purpose of Air, Oil and fuel filters. Lubricants, their various types, grades and their uses.

9. The general layout of motor vehicle, motor cycles and tractor, electrical system.

10. The purpose and principle of operation of iginition system. The difference between spark ignition and C.I. Engines.

11. The purpose and importance of various panel gauges and instruments.

12. The houses, pipes, type and their uses. Purpose and operation of suspension system in common use.

INTERMEDIATE LEVEL (GRADE II) MACHINIST

Knowldege Requirements:

1. The different types of guages, e.g. radius, plug ring, snap, tapers, thread, caliper, drill. Different types of lathe machines, their uses and operations commonly performed.

2. The different types of holding devices and machines chucks in common use.

3. More familiarity with shop drawings.

4. Trigonometric rations and Table.

5. Different types of cutting tool, material and their machining capability.

6. Tool geometry and its application to different materials.

7. Calculations relevant to screw cutting and taper turning.

8. The equipment used for dressing and turning of grinding wheels of pedestal grinders.

9. The different types of shapers, their uses and operations commonly performed.

10. The different types of vices and other clamping devices commonly used in shaping and milling operations.

11. The principles of intricate shaping opetaions. Different types of boring machines and planers. Use of coolants for defferent cutting operation. Cutting speed and feed with relevant formulae.

"WELDER (GAS & ARC): BASIC LEVEL (GRADE-III)

KNOWLEDGE REQUIREMENTS

1. Observance of workshop safety rules and regulations including safety in the use of tools and equipment, self safety. Basic arithmetic and geometrical terminology.

2. The precautions to be observed in the safe utilization, storage and handling of gas cylinders.

3. Basic welding principles.

4. Production of acytelene and safety in the operation of acetylene generators.

5. Identification of cylinders of different gases.

6. Types of welding joints.

7. Types of flames and filler rods, gas pressures and nozzle sizes.

8. The component parts of welding and cutting blow pipes and their safe.

9. The safe operation of various types of regulators and other gas welding and cutting equipment and accessories.

10. The use and maintenance of basic handtools required for marking, grinding, welding and cutting processes and preparing job exercises.

11. Knowledge of measuring tools and instruments. Common welding and cutting defects in gas and arc welding.

12. Proper selection of tools for particular type of welding.

13. The basic knowledge of various electrodes and fluxes.

14. Use and identification of AC and DC Welding Machines.

15. Welding polarity(straight and reverse polarity).

16. Basic Welding terminology.

17. Care and storage of welding electrodes.

18. Classification of commonly used electrodes.

19. Simple drawing reading & basic welding symbols.

20. The relationship between size of electrode and the amperage used for welding.

21. The sequence of welding run in plate welding.

22. Basic knowledge of drilling and riveting.

23. Knowledge of various sections of steel.

24. Basic knowledge of Ferrous and non-ferrous materials.

25. Simple knowledge of brazing and soldering.

PLUMBER/PIPE FITTER-BASIC LEVEL (GRADE - III)

Knowledge Requirements

1. Personal safety and safety precautions in handling equipment tools, supplies and materials.
2. Use, care and basic maintenance of plumbing and pipefitting tools and equipment.
3. Reading of simple working drawings and sketches and an understanding of basic plumbing/pipefitting symbols.
4. Arthmatic of plumbing and the use of conversion charts and tables.
5. Plumbing materials, their uses and proper storage.
6. The types, use and applications of basic plumbing and pipefitting tools, e.g. pipe vices, pipe benders, reaming tools, threading tools and measuring tools.
7. Types of pipes and fittings and their particular application.
8. Pipe cuttings and jointing methods. (PVC and Galvanized steel pipes concrete and cast iron pipes).
9. PVC and galvanized steel pipe bending methods and calculation for pipe bending allowance.
10. The types use and function of valves cocks and taps.
11. Preparation for pipework and the methods of pipe installation for water and gas.

12. Types and function of water pumps.

13. Types and functions of water heaters.

14. Plumbing and pipe fitting regulations and practices application to the work of Grade III plumber/pipefitter.

15. Planning of simple plumbing/pipefitting installation work for single-storey residential building.

16. Galvanized Steel Pipe Works

16.1 Measures Pipes and fittings.

16.2 Cut, ream and thread pipes using stock and dies.

16.3 Bend pipes using mannual or hand operated pipe bends

16.4 Connect/install pipes, fittings and couplings.

16.5 Install valves and by-pass

16.6 Connect pipes from main water supply to the building

16.7 Install water meter.

16.8 Connect piping system for storage tankes including overflow and drain pipes and ball value.

17. Cast Iron Pipe Work

17.1 Select, measure and cut pipes.

17.2 Perform yarning and caulkang.

17.3 Install drawing pipes and set bend for cast iron

18. PVC Pipe Work

18.1 Measure pipes and fitting

18.2 Cut and bend pipes

18.3 Make joints using adhesive or couplings.

19. Concrete Pipe Work

19.1 Select, measure and cut pipe.

19.2 Mix cement mortar and join pipes.

20. Domestic Water Pump Work

20.1 Install water pump.

20.2 Adjust and control pressure and volume

21. Installation of Fixures

21.1 Install sinks

21.2 Install lavantory

21.3 Install bath tub.

21.4 Install standard type water closet W/Cistern, adjustment.

21.5 Install valves and overflow.

21.6 Install flush valve type water closet

21.7 Install urinals.

21.8 Install individual or mixing taps.

22. Domestic Water Heater Installation Work

22.1 Install household gas or electric water heaters.

22.2 Install pipes and connect fittings for hot water piping system.

23. Gas Supply Piping Work

23.1 Install pipe and fittings for gas supply.

23.2 Test Pipes for leaks

23.3 Repair of bricks and concrete affected by plumbing work.

ANNEX - X

LIST OF PERSONS CONTACTED/INTERVIEWED

A. MINISTRY OF EDUCATION

1. Mr. Abdullah Khadim Husain, Joint Educational Advisor.
2. Dr.Ijaz Ahmad Chaudhry, Deputy Educational Advisor.
3. Mr.Mohammad Ishaq Jalalpuri, Deputy Educatimnal Advisor.

B. NATIONAL TRAINING BUREAU, MINISTRY OF LABOUR, MANPOWER & OVERSEAS PAKISTANIS

1. Mr.Sher Akbar, Director Planning & Development
2. Mr.S.Z.A.Jafri, Director Staff Training

C. MANPOWER & TRAINING DEPARTMENT, GOVERNMENT OF PUNJAB

1. Sardar Hidayatullah Khan Moakkal, Director
2. Mr. Afzaal Ahmad, Joint Director
3. Mr.Mohammad Zahid, Vocational Training Specialist (ILO)

D. TECHNICAL TRAINING CENTRE GULBERG, LAHORE

1. Mr.Bashir Akhtar Principal
2. Mr.Mohammad Yousuf, Senior Instructor
3. Mr.Mohammad Sharif Senior Instructor
4. Mr.Mohammad Saeed, Senior Instructor
5. Mr.Anwar Tahir, Senior Instructor.

E. TECHNICAL TRAINING CENTRE MOGHULPURA, LAHORE

1. Mr.Abdul Shakoor, Principal.
2. Mr.Kabir Mohammad, Senior Instructor
3. Mr.Zafar Iqbal, Senior Instructor
4. Mr.Yad Ali Khan, Instructor
5. Mr.Hasan Abbas, Instructor
6. Mr.Ziaullah Mirza, Senior Instructor