No. 1

BASIC DESIGN STUDY ON SOBA UNIVERSITY HOSPITAL MEDICAL EQUIPMENT IMPROVEMENT PROJECT IN THE DEMOCRATIC REPUBLIC OF THE SUDAN

MARCH, 1983

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to the request of the Government of the Democratic Republic of the Sudan, the Government of Japan decided to conduct a survey on the Project to improve Medical Equipment of the Soba University Hospital and entrusted the survey to the Japan International Cooperation Agency (JICA). The JICA sent to the Sudan a survey team headed by Dr. Seiichi Inatomi, Professor, Medical School, Okayama University from January 9 to January 25, 1983.

The team had discussions with the officials concerned of the Government of the Sudan and conducted a field survey in Khartoum.

After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Democratic Republic of the Sudan for their close co-operation extended to the team.

March, 1983

Keisuke Arita

Keisuke Arita
President
Japan International Cooperation Agency

SUMMARY

Soba University Hospital is annexed to the University of Khartoum and it is the only university hospital in the Democratic Republic of the Sudan. It was established in 1975 with U.S.S.R. aid as a tuberculosis medical treatment centre. It was later reorganized and enlarged, and became a general hospital. This hospital is mainly for the training of medical students and nurses, for the encouragement and promotion of research and for the undertaking of difficult case patients. Eight years have passed since it was established and some parts of the existing facilities are showing their age. Furthermore the number of beds (350) is insufficient. Plans have now been made to fully renovate the existing facilities, to increase the number of beds (up to 600) and to establish a new Emergency and Accident Centre in order to meet the rapidly augmenting number of traffic accidents etc.

In view of the situation, the Sudanese Government has made plans for the improvement of medical equipment on condition that the construction of the necessary buildings be complete. They have made a request for cooperation by grant-aid to the Japanese Government.

In response to this request the Japanese government has decided to carry out a Basic Design Study, through the Japan International Cooperation Agency (JICA), in order to study the propriety of cooperation and prepare an appropriate outline for the project.

JICA dispatched a Basic Design Study Team, headed by Dr. Seiichi Inatomi, Professor, Medical School, Okayama University. The Team was originally scheduled to conduct the study between 9th January and 1st February, 1983.

The team was dispatched in order to confirm the intentions of the Sudanese, to study the situation, to select appropriate medical equipment, to survey the present conditions of the buildings including the power and water supplies, and to make medical equipment installation plans.

Through the survey at the site, it was confirmed that construction work on the buildings which are to comprise the Emergency and Accident Centre has been halted owing to an insufficient budget, even though the slabs and the columns were completed one year ago. As far as the extension of

the existing facilities is concerned, construction work has not even begun on the wards. Construction work on the laboratory is in progress, but it is estimated to take another six to twelve months to reach completion.

In view of this situation the team decided that it was impossible to carry out their study as originally planned and they reached a mutual agreement with the Sudanese that the medical equipment needed for the Emergency and Accident Centre and the wards of the existing hospital to be extended, be excluded from the scope of the study. Furthermore the study period was shortened by one week to 25th January.

The Sudanese emphasized that top priority be placed on the Emergency and Accident Centre. They also indicated that they would make a request for cooperation by grant-aid not only for the installation of the equipment, but also for the construction of the Centre itself.

Through the study which was carried out on the medical equipment of the existing facilities at Soba University Hospital, suitable medical equipment was selected, mainly for the Operation department, the X-ray department and the Laboratory department. Installation plans were also designed for medical equipment which requires modification.

Soba University Hospital should be one of the most sophisticated hospitals in the Sudan and help to improve the Sudanese Medical Service. For this purpose, the project is considered to be very important, grant-aid from the Japanese Government for Soba University Hospital, Medical Equipment Improvement Project should be carried out as soon as possible.

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CHAPTER I

INTRODUCTION

1-1 INTRODUCTION

Soba University Hospital is annexed to the University of Khartoum. Since it was established in 1975, it has, as the only university hospital in the Sudan, served as both a training centre for medical students and nurses and as medical treatment centre for patients throughout the Sudan. However the age of the existing facilities and the insufficient number of beds has become a hindrance. Consequently the Sudanese have planned to renovate and extend the existing facilities and also establish a new Emergency and Accident Centre. On condition that the extension of the existing buildings and the construction of the new buildings be complete, the Sudanese Government has planned the improvement of the medical equipment and made a request for cooperation to the Japanese Government for both the necessary financial and technical aid. In response to this request the Japanese Government dispatched the Basic Design Study Team in January 1983, through the Japan International Cooperation Agency (JICA).

The purpose of this study was to confirm the requests of the Sudanese, to study the operation of Soba University Hospital and the Emergency and Accident Centre, to survey the conditions of the existing facilities and to prepare an appropriate Basic Design for the project based on these results. The team confirmed the details of the requests and had discussions with the members of staff of Soba University Hospital and the Faculty of Medicine, University of Khartoum.

The Minutes of the Discussions were signed by both a representative of the Sudanese Government and of the team. The Basic Design shall be prepared on the basis of the said Minutes.

CHAPTER 2

OUTLINE OF THE UNIVERSITY OF KHARTOUM

2–1 HISTORY OF THE UNIVERSITY OF KHARTOUM AND OUTLINE OF THE FACULTY OF MEDICINE

Originally the University of Khartoum, then a college, was founded by Lord Kitchener in 1898 in memory of General Gordon. From then on, the scope of education was gradually increased and by 1940 it comprised Agriculture, Arts, Law, Science and Engineering and Veterinary Science faculties. In 1947 academic cooperation was extended from the University of London and in July 1956, just after the Independence of the Sudan, it was formally recognized as a university. Today apart from the faculties mentioned above it also comprises Economic and Social Studies, Education, Medicine, Pharmacy and Engineering and Architecture faculties.

At present the University has 660 members on the teaching staff (550 Sudanese, 110 expatriates) and approximately 100 of them are carrying out research overseas. There are 7,900 undergraduate students, 1,000 post-graduate students and approximately 1,000 extra-mural students carrying out research at the University. It may be said in passing that the population of the Sudan is approximately 18,000,000 people. There are approximately 400,000 people falling into each teenage group. Approximately 30,000 of them graduate from high school and approximately 15,000 of them enter university. Approximately 4% of them enter university.

There are approximately 60,000 university students in the Sudan and consequently approximately 13% of them are at the University of Khartoum. The University of Khartoum is considered to have the highest academic level of all the universities in the Sudan.

The Faculty of Medicine has departments in the following subjects: Anatomy, Anaesthesia, Biochemistry, Medicine, Microbiology and Parasitology, Obstetrics and Gynaecology, Physiology, Psychiatry, Paediatrics and Child Health, Surgery, Community Medicine, Orthopaedics and Dentistry. Academic lectures and guidance are carried out on the campus which is located in the centre of Khartoum however clinical education is mainly carried out at Soba University Hospital which is situated on the outskirts of Khartoum.

2–2. MEDICAL EDUCATION AND TRAINING AT THE FACULTY OF MEDICINE, UNIVERSITY OF KHARTOUM

There are 240 students in each year at the Faculty of Medicine, University of Khartoum, therefore there are approximately 1,400 students covering the six years. Three years clinical education is given to each student. In other words Soba University Hospital has to train 720 of the students (240 x 3). However training also takes place at Khartoum Hospital, Omdurman Central Hospital, Khartoum North Central Hospital and the Military Hospital. After graduating from the Faculty of Medicine, they have to take one more year of training as a House Officer. These House Officers undergo training at provincial hospitals in such places as Atbara, Wad Madani and Port Sudan etc. The Sudan is divided into six medical administrative regions and each region has its own Provincial Hospital.

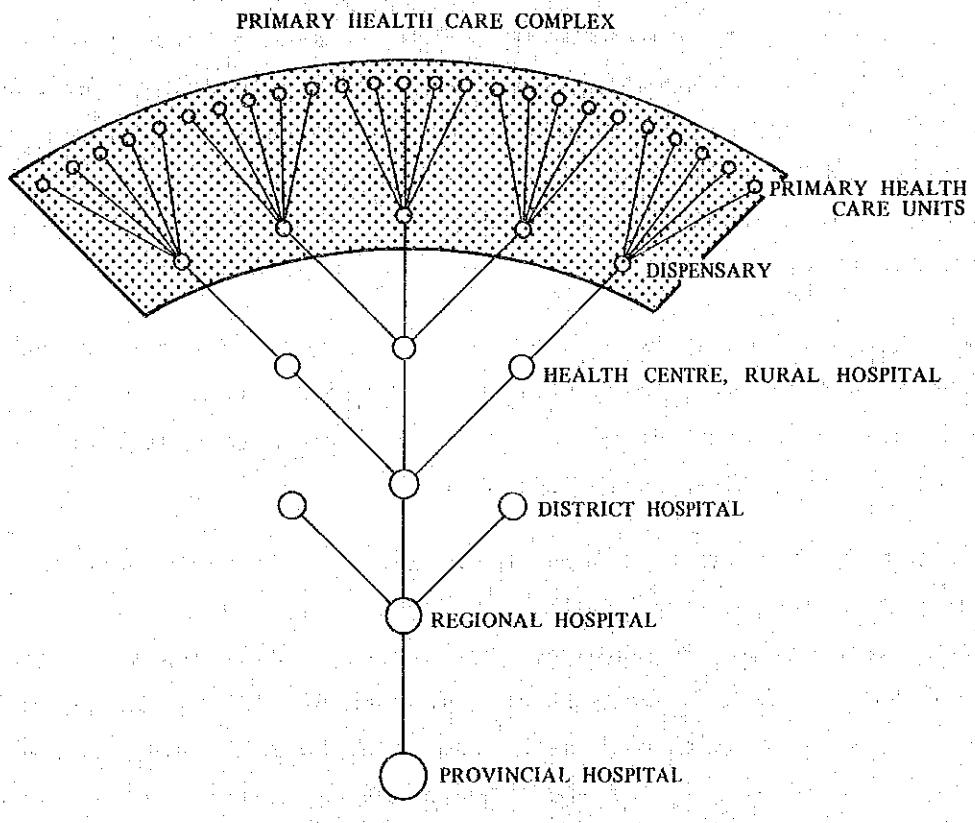

Fig. 1. Medical Composition Diagram in the Sudan

One year later the House Officers are promoted to Medical Officers and they are moved to Regional, District or Rural Hospitals as doctors who are attached to Provincial Hospitals. Later they become Registrars and Con-

sultant doctors through practical experience and examination. The dispensaries and primary health care units etc. are run by medical assistants and qualified nurses. They concentrate their efforts mainly on preventive medicine. Doctors do not tend to remain in these units permanently.

In this training programme the improvement of Soba University Hospital is a matter of urgency for the Faculty of Medicine, University of Khartoum, as it should be the main facility for the clinical training of undergraduate students.

CHAPTER 3

OUTLINE OF SOBA UNIVERSITY HOSPITAL, THE EMERGENCY AND ACCIDENT CENTRE

3-1. ROLE OF SOBA UNIVERSITY HOSPITAL

The hospital, situated outside Khartoum, was originally established with U.S.S.R. aid as a tuberculosis medical treatment centre. Later on it became the hospital annexed to the Faculty of Medicine, University of Khartoum. Today it comprises such disciplines as Surgery, Urology, Orthopaedics, Paediatrics and Child Care and Obstetrics and Gynaecology, and it has 350 beds. According to the regulations of the University of Khartoum, Soba University Hospital, annexed to the Faculty of Medicine, should deal with the treatment of patients, the training of undergraduate students and the promotion of research. To put it in concrete terms:

(1) to undertake in coordination with the Ministry of Health, the medical care of patients;

(2) to train and instruct undergraduate students of the Faculty of Medicine;

(3) to promote research and development;

(4) to train post-graduates of the Faculty of Medicine mainly house officers;

(5) to train medical assistants and nurses;

(6) to perform other necessary functions relating to the above.

All the operating costs are financed by the Ministry of Higher Education through the University of Khartoum. For accounting purposes the Hospital is treated independently from the University. In the Sudan, medical treatment costs are financed by the government. Therefore there are no examination charges except for special diagnosis and visitors' admission fees.

Among the buildings which are under construction on the adjacent site there is a Laboratory Complex which accommodates laboratories, a blood bank, lecture rooms etc. It constitutes a part of Soba University Hospital. The Emergency and Accident Centre consists of a further ten buildings.

3-2. OPERATION OF SOBA UNIVERSITY HOSPITAL

The Management Board of the Hospital shall consist of: the Dean of the Faculty of Medicine, the Vice-Chancellor, the Director of Soba University Hospital, the Heads of all Departments, a representative from the Ministy of Finance, a representative from the Faculty of Pharmacy, a representative from the Faculty of Veterinary Science, two non-medical members to be appointed by the Director, the president of the Medical Research Council and a representative from the Ministry of Health. The operation costs in fiscal 1982/1983 can been seen in Table 1., The total operation costs were estimated as 3,879,100 LS with 350 beds, 1 bed = 11,100 LS similarly one bed in the training hospital (11,300 LS) which is being built with Japanese grant-aid. However there is a big difference in personnel expenses, 54% at Soba University Hospital while 37% at the Training Hospital. Expenditures on drugs, medical equipment and maintenance in Soba University Hospital are slight compared with the personnel expenses, therefore it is presumed that either the medical equipment is not being fully used or that the medical equipment which ought to be being used is insufficient. Actually during the survey at the site, while the number of rooms and the number of staff in charge were sufficient, the quantity of medical equipment was observed to be insufficient.

1) Personnel Expenses	
Fixed Salary	1,141,131 LS
Assorted allowances (overtime, bonus, etc.)	821,969
Pensions; Social Insurance	136,000
	2,099,100 LS
2) Material cost; Maintenance Cost (drugs, medical equipment; electricity; fuel; gas; etc.)	1,500,000 LS
3) Consuming articles, replacing spare parts and others	280,000 LS
1) + 2) + 3)	3,879,100 LS
	(approx. ¥710,000,000)

1 U.S. dollar = 1.283 Sudan pounds = 235 yen

Table 1. Soba University Hospital Operation Costs (1982/83) (Source: From Administrative department of Soba University Hospital.)

As far as the medical treatment system is concerned, inpatients are treated 24 hours a day and outpatients are treated between 7:00 and 14:00. The doctors in charge of the outpatient department work on an alternating shift system between 7:00 and 10:00, 10:00 and 14:00. However because of the transportation problem, the first shift actually begins at 8:00.

Number of Outpatients are given in Table 2.

Month		Number
July 1981	:	1382
August	:	2547
September	:	1539
October	:	2795
November	:	1018
December	:	2953
January 1982	:	3248
February	:	3584
March	:	3855
April	:	2739
May	:	4405
June	:	4447
Total		34512

Table 2. Number of Outpatients per month (1981/1982)
(Source: Medical Record of Soba University Hospital)

As stated in the above table there are 34 - 150 patients a day (0.1 - 0.4 patients per bed). This is slightly less than Khartoum Hospital (1,000 beds) where there are 500 - 600 patients a day (0.5 - 0.6 patients per bed)

Number of Inpatients are given in Table 3.

The average length of stay in hospital tends to be more in the Orthpaedic and Medicine Departments and less in the Surgery Department, giving an average of approximately 17 days. This is slightly longer than Khartoum Hospital where there is an average of approximately 7 - 11 days. Table 4 gives the occupancy of beds rates. The occupancy in the Surgery Department is low. This is one of the reasons that makes the average length of stay in hospital long. As far as Khartoum Hospital is concerned this rate

is more than 100% in all departments. As stated above, it is evident that this hospital, as compared with other hospitals in Khartoum, is operated somewhat inefficiently.

Months	No of Admissions	No of Discharge
Jul, 1981	491	519
Aug.	620	524
Sept.	595	611
Oct.	595	565
Nov.	632	599
Dec.	686	696
Jan., 1982	659	621
Feb.	586	532
Mar.	706	720
Apr.	679	751
May	700	629
Jun.	497	506
Total	7,446	7,273

Table 3. Patients Movement by Months
(Source: Medical Record of Soba University Hospital)

WARDS		NO.
Men surgery	:	40%
Women Surgery	:	48%
Urology	:	90%
Plastic Sur.	:	99%
Peadiatric Sur.	:	79%
Medicine (Men) (A)	:	88%
" " (B)	:	87%
Med. (Women) (A)	:	82%
" " (B)	:	92%
Pead. Med.	:	35%
Koash	:	65%
Gaynea.	:	97%
Obs.	:	103%
Private rooms plastic sur.	:	86%
" " koash	:	104%

Table 4. Occupancy of Beds
(Source: Medical Record of Soba University Hospital)

3-3 SIGNIFICANCE OF THE ESTABLISHMENT OF THE EMERGENCY AND ACCIDENT CENTRE

The first significance of the establishment is concerned with comprehensive clinical training. Most of the training in the "hot" departments, for example treating external injuries, appendicitis etc., is mainly carried out at Khartoum Hospital and other hospitals. However most of the training in the "cold" departments, for example treating gallstones, nephritis etc., are mainly carried out at Soba University Hospital. In Khartoum Hospital inpatients are even lying in the corridors due to overcrowding and it cannot be said that adequate education and training are carried out under these conditions. If the Emergency and Accident Centre adjacent to Soba University Hospital were to be completed it would be possible for comprehensive training in the "hot" and "cold" departments to be carried out.

The second significance is concerned with the improvement of medical treatment services. Along with the increase in the number of motorcars around Khartoum there is also an increase in the number of traffic accidents. At present casualties in accidents are taken to the hospital by volunteer drivers passing-by. The dispensation of emergency medical treatment, including the hospital facilities and the ambulance services, is inadequate. The future Emergency and Accident Centre would have a radio communication centre. They would take telephone calls from the detectors and contact the patrol cars, ambulances, the police and other patrol cars. First aid would be carried out in the ambulance on the way to Soba University Hospital from the point of the accident. The Emergency and Accident Centre itself would be able to call in the necessary staff for treatment and prepare medical equipment in advance. This Centre would not only involve traffic accidents but it would also involve sudden illness or sudden delivery.

The Emergency and Accident Centre is planned to concentrate on Orthopaedics, Paediatrics and Child Care and Obstetrics.

CHAPTER 4

EXISTING FACILITIES OF SOBA UNIVERSITY HOSPITAL

4-1 PRINCIPAL PARTS OF THE MAIN BUILDINGS

The outline of the existing buildings is given in Fig. 2. The site is located approximately 300 m. from the Khartoum - Port Sudan High Road. The openings to the rooms are layed out to catch north and south winds which are constant in the Sudan. Except for the Operating Department and the X-ray Department etc. all rooms have open sided corridors. This lay-out means that the air can circulate naturally. Buildings for service departments which might cause noise or smell are set apart from the main buildings. The courtyards and the connecting walkways are appropriately laid out. The gardens with their trees and shrubs are well tended. These buildings can be valued for their suitability to both the Sudanese climate and the way of life.

The results of the survey for the main rooms in each department with regard to developing the functions of the existing facilities are as follows:

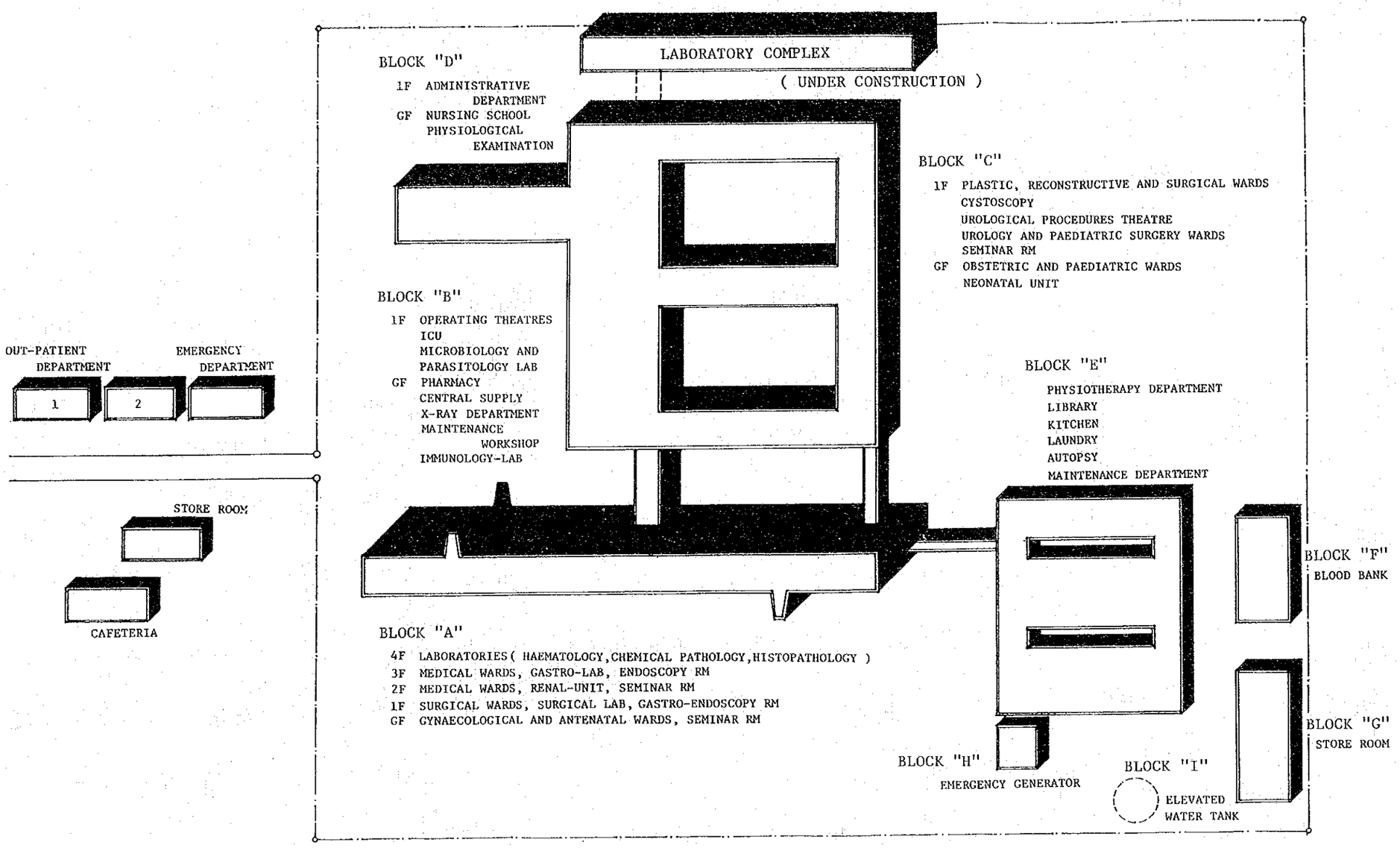

Fig. 2 Outline of Existing Buildings

(1) Operating and Anaesthetic Departments

There are 4 operating rooms, 1 small operating room, 1 recovery room (4 beds) and ICU (6 beds). A lot of operations are performed, therefore clinical training can be carried out efficiently. As far as the clean-zone of the Operating Department is concerned, the operating rooms have wood framed windows, cooled by window type coolers and illuminated by lighting aparatus suspended from the concrete slab in the ceiling. Moreover the frequent comings and goings of students, the fact that the doors to the operating rooms are left open, and invasion of dust can not be avoided, therefore it is difficult to keep the clean-zone in the operating department.

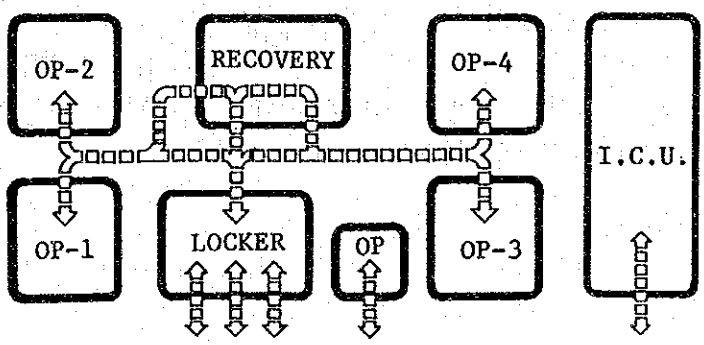

Fig. 3 Layout of Operation Department

(2) Delivery Room and Neonatal Unit

In the Delivery room the obstetric beds and the instruments are layed out side by side. The floor is so uneven that it is not easy to keep the obstetric beds level. Throughout the entire ground floor the floor seems to rise and subside in a remarkable way. The reason is that the sandy clay, containing limestone, under the floor absorbs the rain water and thus creates expansion and shrinkage. The ground floor slab is not made of reinforced concrete, it is made of PVC tiles on concrete blocks layed upon sand. There are two obstetric beds in the Delivery room and two infant incubators in the Neonatal Unit. However one of the incubators is not in perfect condition.

(3) Pharmacy and Central Supply Room

Drugs are dispensed in the following way: 80% tablets, 15% tonics, 5% powders. The drug store room is well operated. There is a drugs locker for poisons. With this room, also being on the ground floor, the floor rises and subsides badly. It is difficult to keep the shelves, lockers and refrigerators level. Three autoclaves are in use in the Central Supply.

a. Large autoclave

It is connected to compressor and a boiler and it is used to sterilize most of the equipment in the hospital.

b. Small autoclave No. 1 (with internal boiler)

c. Small autoclave No. 2 (with internal boiler)

As these autoclaves are all equipped with boilers, there is no central steam supply in the hospital.

(4) X-ray Department

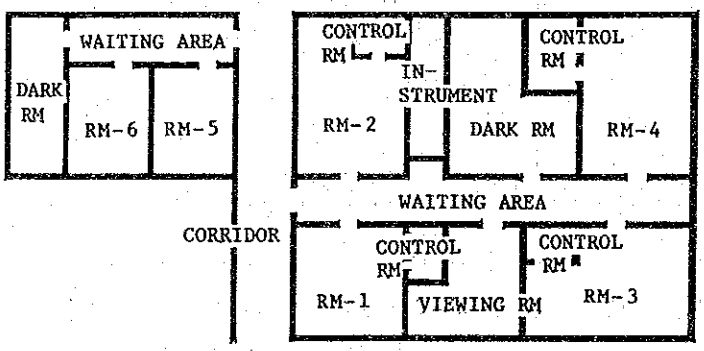

Fig. 4 Layout of X-ray Department

RM-1 There is an X-ray tomography apparatus which is out of order. The floor on which the apparatus stands does not have concrete foundations and is subsiding. The apparatus is tilting.

RM-2, 3 An X-ray apparatus with a TV screen has been in use for three years and the floor is not subsiding. New foundations were presumed to be built at the time of the installation.

RM-4 The Russion X-ray apparatus was installed initially but it wore out and was discarded. The control room was remodelled for other purposes and the X-ray room itself became a store room.

RM-5, 6 The small X-ray apparatus is in use.

Anti X-ray lead plates have been fixed around the doors and view windows of each room. The glass in the view window is not lead glass. The walls around the X-ray room are 20 cm thick and made of bricks and mortar. All the doors of the X-ray rooms are only 100 cm wide. This is a problem as concerns the installation of large medical equipment. As this department is also on the ground floor, the floors in all the rooms are uneven.

(5) Laboratory Department

There is enough space but there are many pieces of equipment which have fallen into disrepair. There are rooms where the wood framed windows remain open. It is not fit for the installation of precise equipment. As far as the Immunology and Microbiology Sections are concerned, the rooms and medical equipment are well maintained and operated.

As far as the maintenance and operation of the building are concerned, supervision comes under the management of the University of Khartoum. Air conditioning, water supply, drainage and electricity are taken care of by hospital staff. By some mistake the as-built drawings of the hospital have completely disappeared and consequently it is very difficult to carry out remodelling and renovation works.

4-2 ELECTRICAL AND MECHANICAL FACILITIES

Electrical Facilities

Electricity comes over by 11 KV from the nearby Kilo Aschunun power plant. There are two power cables running from Damazin and Bongi to the Kilo Aschunun power plant. Electricity is supplied along either of these cables depending on the power supply. Power failures occur frequently in Soba as well as in Khartoum, and the power supply conditions are rather poor.

The electric power is reduced from 11 KV to 415 V/240 by the Russian transformer. There are two 600 KVA transformers. One of these transformers is used as a standby. There are threee power generators, one 560 KVA and two 132 KVA generators. However one of the 132 KVA generators has broken down and spare parts are not available in the Sudan. The British made 560 KVA generator was installed only a year and a half ago.

The outlets and the lighting equipment are not in good condition but they have at least been installed in the principle rooms. The power supply is adequate for medical treatment apparatus but the quality of the electricity is poor. The only communication system within the buildings is a telephone system. The nurse calling system is a simple one but it is broken and cannot be used. There are four city telephone lines and 60 extension telephone lines.

Air Conditioning

Air conditioning is done by means of window type coolers and water coolers. There is neither central nor packaged type air conditioning. Consequently there is no humidity control. Window type coolers are mainly installed in the rooms such as the operating rooms and the X-ray rooms. Water coolers are installed in the wards, the laboratories and the workshops. The air conditioning in the operating rooms, which demand a high level of cleanliness, is done by window type coolers. The fact that these types of cooler do not filter the air efficiently is a problem.

Water Supply

There are no city water mains, well water is used. It is said that the well water is potable, there is neither sterilization nor filtration equipment. Well water is used for drinking and sprinkling. Drinking water runs approxi-

mately 170 m. underground and sprinkling water runs approximately 35 m underground. The water is pumped up into elevated tanks and then supplied to suitable places. The pipes are made of steel. The pipes in the dark rooms are rusty because of the chemicals used there. The water to be used for medical treatment, for example for Kindney Dialysis, should be passed through filters, however there are not enough filters.

Drainage

There are septic tanks within the site. The water is piped from the septic tanks to beyond the site where it is discharged and it permeates the soil. There are two drainage pumps. One of them has a diesel engine and can function in the event of a power failure.

Waste Disposal

Waste is mainly incinerated within the site and the remains are removed to specified municipal dumps.

Fuel

Mainly butane gas is used. There is a gas tank (capacity approximately 2,000 litres). Small portable cylinders are used in the Laboratory department. In the kitchen charcoal is used for various kinds of cooking.

Kitchen Equipment

There is nearly all the necessary kitchen equipment but some of it is out of condition. The water which spills onto the floors of the kitchen is mopped up and drains away. The uneveness of the floor would be a problem, but there is no bad smell because of adequate cleaning.

Maintenance

There are resident members of staff in charge of maintenance of the electrical facilities, however plumbing engineers have to be called in to carry out repairs. The simple apparatus is repaired in the small workshops. However it is difficult to obtain spare parts and there are many pieces of equipment which have fallen into disrepair.

CHAPTER 5

CONSTRUCTION WORK OF THE EMERGENCY AND ACCIDENT CENTRE

5–1 CONSTRUCTION WORK OF THE EMERGENCY AND ACCIDENT CENTRE

The outline of the Emergency and Accident Centre and the Laboratory Complex is shown in Fig. 5. The Emergency and Accident Centre and Soba University Hospital are designed to form a comprehensive medical complex. They are layed out in such a way as to improve the education and training of the students, and improve the medical service by connecting all the buildings with covered walkways.

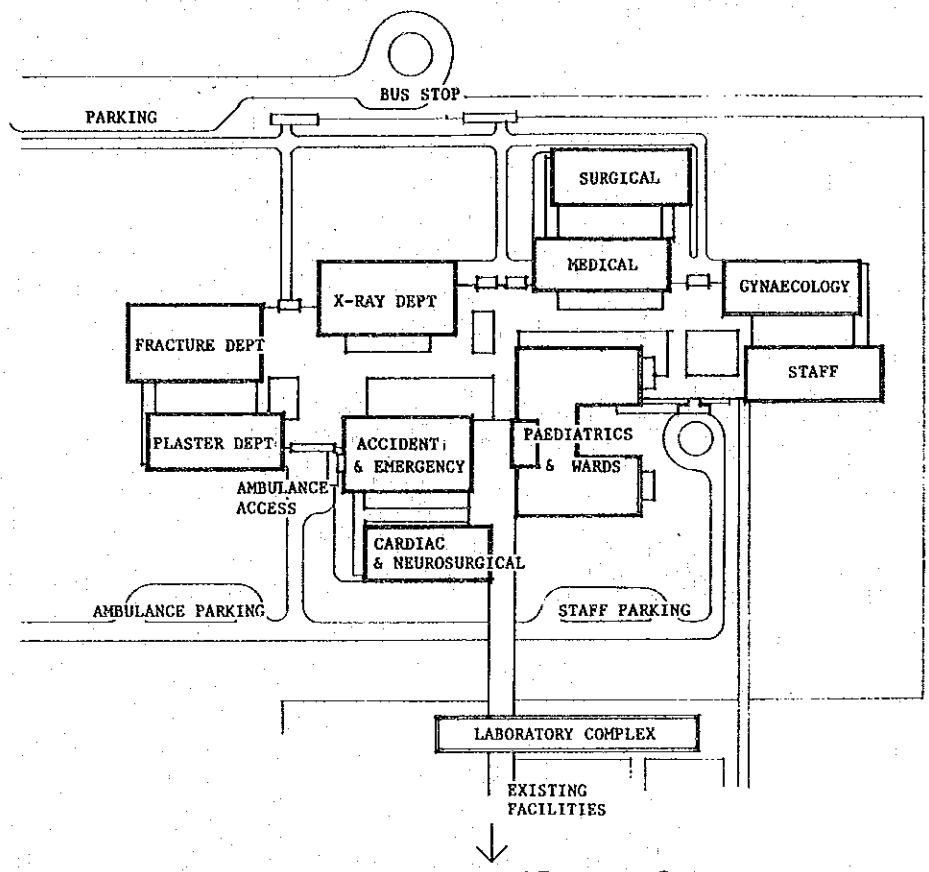

Fig. 5. Outline of Accident and Emergency Centre

The budget for building was allocated to the Laboratory complex which is annexed to Soba University Hospital and construction is expected to be completed by the end of 1983. The main structure of the ground floor, the outside brick walls, the first floor concrete columns and beams have reached completion. As far as the ten buildings which make up the Emergency and Accident Centre are concerned, all the buildings are under construction, but a building budget was not allocated and construction has not proceeded for one year. At present the concrete work of each building, excluding the wards, is completed. All the buildings are now at different stages of construction. The block nearest completion is the X-ray building

Where the internal walls have been mortared and window frames and door frames have been fitted. Window panes have not been fitted as yet. There are places where the wiring tubes have been fitted but there are no water pipes. The walls around the X-ray room are 25 cm. thick, measures have been taken against radiation. There are no steel bolts on the ceiling slab even though they are necessary for the installation of ceiling rails for X-ray apparatus with TV screens. The reinforced concrete work throughout the buildings is inadequate.

CHAPTER 6
MEDICAL EQUIPMENT PLAN

6-1. EXISTING MEDICAL EQUIPMENT

The state of the medical equipment in the existing facilities is as follows.

(1) Operating and Anaesthetic Departments

The maintenance of medical equipment is comparatively good and operational efficiency is high. There are four operating rooms. Two of them are for general use, the other two are mainly for obstetrics and gynaecology. In particular there are many Caesarean operations. The small surgical instruments, the anaethetic equipment and the ventilators are old fashioned. They are in frequent use and definitely need improvement.

(2) Delivery and Neonatal Unit

The Obstetrics beds and the incubators are old. They are in frequent use and definitely need improvement. General medical equipment is insufficient.

(3) X-ray Department

At present four machines are being used. This department is comparatively busy. In order to lighten the load of the existing X-ray apparatus with a TV screen, new tomography apparatus should be installed. The two automatic processing machines are in use but the two supplementary manual processing machines are out of condition.

(4) Laboratory Department

The maintenance of equipment in the Immunology and Microbiology sections is comparatively good. However, the equipment in the Haemology, Pathology, Biochemistry and Parasitology sections frequently breaks down and does not meet normal requirements. There are also pieces of equipment which are not used because the operation manuals have disappeared, or supplies and spare parts are lacking.

(5) Blood Bank

Blood is donated at a rate of 20 people a day and operation is comparatively good. Reagents, blood bags etc. are insufficient.

(6) Mortuary

There is one autopsy table. There is one fluorescent light but no shadowless light. At present there are few autopsies but they are essential for medical research and the conditions of the mortuary should be improved.

(7) Dialysis Section

There are two beds in the Kidney Dialysis room. Although the equipment is usable, the packs of supplies and drugs are inadequate and operational efficiency is poor.

(8) Outpatient Department

The Outpatient Department consists of two independent buildings which are located outside the hospital boundary. They hold examination rooms and small operating rooms. The sterilized instruments and consumables come from the Central Supply room in the hospital.

(9) Consumables

In all departments consumables are very insufficient. Items which are made for disposal after use are used repeatedly.

The above statements relate to the conditions in each department. All in all it does not meet the requirements of a General Hospital. It is difficult to say that each department functions properly. The difference between the departments which are operated properly and those which are not is remarkable. As a university hospital which ought to encourage research and development it must be pointed out that medical equipment should be correctly installed throughout each department and that the standard of medical service should be comprehensively raised. As was already mentioned in Chapter 5, the construction work of the Emergency and Accident Centre is not yet completed. This project is for the improvement of the medical eqipment in the existing facilities. The details of the medical equipment are given in the Medical Equipment List in 6-2.

6-2 MEDICAL EQUIPMENT LIST

(A) Operating Department

1. Minor operating light, mounted on heavy base with caster, 5 bulbs, with 10 spare bulbs — 2

2. Operating light, for emergency, 5 bulbs, complete with battery box, with 10 spare bulbs — 1

3. Stretcher, steel baked enamel, with vinyl-coated sponge mattress — 10

4. Electro surgical unit, solid state, complete with accessories — 2

5. Suction unit, state of vacuum up to 750 mm/Hg and capacity of 45 l/min., suction bottle 3000 cc x 2 pcs, complete with accessories and 2 spare bottles — 2

6. Suction unit, table type, vacuum 750 mm/Hg, capacity 24 l/min., suction bottle 500 cc x 2 pcs, complete with accessories and 2 spare bottles — 2

7. Operation microscope, for neurosurgery, standard set, Olympus Model OME-NC-1-W or equivalent — 1

8. Operating Instrument Set — 3
   In metal case
   Contents:

(1)	Amputaing knife	2 pcs
(2)	Periostetome	1 pce
(3)	Resecting knife	1 "
(4)	Teotome	1 "
(5)	Scalpel	3 pcs
(6)	Operating knife, sharp pointed	3 "
(7)	Ditto, curved probe pointed	1 pce
(8)	Operating scissors, straight	3 pcs
(9)	Ditto, curved on flat	3 "
(10)	Kocher hemostatic forceps, with mouse teeth	30 "

(11)	Kocher hemostatic forceps	10 pcs
(12)	Thumb dressing forceps	5 "
(13)	Mouse tooth tissue forceps	3 "
(14)	Set of aneurism needles	1 set
(15)	Retractor, 2 prongs, blunt	2 pcs
(16)	Flat blade retractor	4 "
(17)	Peritoneal forceps	6 "
(18)	Intestinal forceps	4 "
(19)	Lieus trocar	1 pce
(20)	Gossett selfretaining abdominal retractor	1 "
(21)	Double-ended curette	1 "
(22)	Set of bone curettes	1 set
(23)	Periosteal raspatory	1 pce
(24)	Langenbeck bone holding forceps	1 "
(25)	Sequestrum forceps	1 "
(26)	Luer bone rongeur	4 pcs
(27)	Liston bone cutting forceps	1 pce
(28)	Chanrriere amputating and resecting saw	1 "
(29)	Langenbeck metacarpal saw	1 "
(30)	Bone file	1 "
(31)	Metal retractor for amputation of legs	1 "
(32)	Chisel	2 pcs
(33)	Gouge	2 "
(34)	Lead filled bone mallet	1 pce
(35)	Towel forceps	4 pcs
(36)	Mathieu needle holder, 19 cm	2 "
(37)	Suture needle	30 "
(38)	Abdominal suture needle	20 "
(39)	Suture bobbin	1 pce
(40)	Cleveland ligature carrier	2 pcs
(41)	Esmarch tourniquet	1 pce
(42)	Probe with eye	5 pcs
(43)	Grooved probe	2 "

9.	Small Operating Instruments Set	3	
	In metal case.		
	Contents:		
	(1) Operating knife	3	pcs
	(2) Retractor, one-prong	1	pce
	(3) Double-ended curette	1	"
	(4) Probe	1	"
	(5) Tissue forceps, 1 x 2 teeth	1	"
	(6) Operating scissors, straight	1	"
	(7) Ditto, curved	1	"
	(8) Kocher hemostatic forceps	2	pcs
	(9) Mathieu needle holder	1	pce
	(10) Suture needle	5	pcs
	(11) Hanks of suture	2	"
	(12) Suture needle container	1	pce
10.	Laparotomy Instruments Set	5	
	In stainless steel case.		
	Contents:		
	(1) Bard-Parker's handle, No.4	1	pce
	(2) Ditto , No.3	1	"
	(3) Operating scissors, curved, 18 cm	1	"
	(4) Ditto , 14 cm	1	"
	(5) Operating scissors, straight, 14 cm	1	"
	(6) Mayo's operating scissors, 16 cm	1	"
	(7) Angular scissors for dissection	1	"
	(8) Tissue forceps, with teeth, middle	2	pcs
	(9) Ditto , small	2	"
	(10) Tissue forceps, without teeth, large	2	"
	(11) Ditto , middle	2	"
	(12) Ditto , small	2	"
	(13) Towel clip, box-lock, 10 cm	6	"
	(14) Kocher's hemostats, 14.5 cm	25	"
	(15) Ditto , 16 cm	2	"
	(16) Pean's hemostats, 14.5 cm	10	"
	(17) Ditto , 16 cm	4	"
	(18) Mikulicz peritoneum forceps	8	"
	(19) Kelly's hemostats, 19 cm	10	"

(20)	Mathieu's needle holder, 19 cm	4 pcs
(21)	Urabe's needle holder, 19 cm	2 "
(22)	Thyroid sound	1 pce
(23)	Deschamp's ligature needle	1 pair
(24)	Malleable retractors, large	1 pce
(25)	Ditto , small	1 "
(26)	Self-retaining retractor	1 "
(27)	Langenbeck's retractor, 1.3 x 4 cm	1 pair
(28)	Ditto , 2.5 x 6 cm	1 "
(29)	Ditto , 11 x 4 cm	1 "
(30)	Probe, 18 cm	1 pce
(31)	Tin probe	1 "
(32)	Abdominal retractor, large	1 pair
(33)	Ditto , small	1 "

11. Cholecystotomy Instruments Set 3

In stainless steel case.

Use Laparotomy Instruments Set. Add the following:

(1)	Hemostats, curved, 24 cm	5 pcs
(2)	Kocher's hemostats, with teeth, 24 cm	3 "
(3)	Lung grasping forceps, 21 cm	3 "
(4)	Luer's gallstone scoop, 24 cm, 3 sizes	3 sets
(5)	Thompson's gallstone forceps, 24 cm	1 pce
(6)	Biliary duct bougie, 27 cm, 3 sizes	3 sets

12. Gastrectomy Instruments Set 3

In stainless steel case.

Use Laparotomy Instruments Set. Add the following:

(1)	Doyen's intestinal clamp forceps, curved	3 pcs
(2)	Stomach clamps	2 "
(3)	Moynihan's intestinal clamp forceps	1 pce
(4)	Gastrointestinal suturing instrument set	1 set
(5)	Stomach total-extirpation set	1 "

13. Proctotomy Instruments Set 3

In stainless steel case.

Use Laparotomy Instruments Set. Add the following:

(1)	Tissue forceps, with teeth, large	2 pcs
(2)	Urabe's hemostats, curved, fine point, large	3 "
(3)	Nakayama's self retaining retractor	1 pce
(4)	Roser's probe, 14 cm	1 "
(5)	Doyen's intestinal clamp forceps, 23 cm	3 pcs
(6)	Right angle stomach clamp, 21 cm	1 pce
(7)	Gastrointestinal suturing instrument	1 set
(8)	Uterine forceps, 27 cm	1 pce
(9)	Stille-Luer's double action rongeur, curved, 23 cm	1 "
(10)	Sauerbruch's bone rongeurs, double action, 22,5 cm	1 "
(11)	Jenkins gouges, 10 widths	1 set
(12)	Heath mallet	1 pce

14. Nephrectomy Instruments Set 3

In stainless steel case.

Use Urological Surgical Basic Set. Add the following:

(1)	Operating scissors, curved, 20 cm	2 pcs
(2)	Long angular scissors	1 pce
(3)	Kocher's hemostats, with teeth, box-lock	20 pcs
(4)	Kelly's artery forceps, 19 cm	6 "
(5)	Kocher's retractor, 2-prong, sharp	1 pair
(6)	Tissue forceps, without teeth, 18 cm	2 pcs
(7)	Young's kidney pedicle clamp forceps, large	2 "
(8)	Ditto , small	2 "
(9)	Sponge forceps, 23.5 cm	2 "
(10)	Allis's intestinal forceps, 19 cm, box-look	2 "

15. Prostectomy Instruments Set 3

In stainless steel case.

Use Urological Surgical Basic Set. Add the following:

(1)	Operating scissors, curved, 18 cm	1 pce
(2)	Ditto , 14 cm	
(3)	Tissue forceps, without teeth, 18 cm	2 pcs
(4)	Kelly's artery forceps, 19 cm	6 "
(5)	Young's prostatic lobe-holding forceps, 20 cm	2 "

(6)	Allis's intestinal forceps, box-lock, 19 cm	2 pcs
(7)	Sponge forceps, 23.5 cm	2 "
(8)	Muzeux's uterine vulsellum forceps, 26 cm	2 "
(9)	Kocher's retractor, 2-prong, sharp	1 pair
(10)	Legueu's bladder retractor	1 pce

16. D and C Set 3

In stainless steel case.

Contents:

(1)	Bumm's uterine curette, set of 5 sizes	1 set
(2)	Hegar uterine cervical dilator, brass chrome plated, set of 15	1 "
(3)	Uterine valsellum forceps, curved	1 pce
(4)	Placenta forceps	1 "
(5)	Bozeman uterine packing forceps	1 "
(6)	Forester sponge forceps, straight, 24 cm	4 pcs
(7)	Adzuma vaginal speculum, for drainage	1 pce
(8)	Kristeller's vaginal speculum, set of 3 sizes	1 set
(9)	Simpson uterine sound, flexible silver end, graduated in cm	1 pce
(10)	Cusco's vaginal speculum, brass chrome plated, set of 3 sizes	1 set

17. Urological Surgical Basic Set 3

In stainless steel case.

Contents:

(1)	Bard-Parker's handle, No. 3	1 pce
(2)	Ditto , No. 4	1 "
(3)	Operating scissors, curved, 18 cm	1 "
(4)	Mayo's operating scissors, 16 cm	1 "
(5)	Operating scissors, straight, 14 cm	1 "
(6)	Tissue forceps, with teeth, 18 cm	3 pcs
(7)	Ditto , without teeth, 15 cm	3 "
(8)	Towel clip, box-lock, 13.5 cm	4 "
(9)	Kocher's hemostats, with teeth, 14.5 cm	20 "
(10)	Mosquito artery forceps, straight, 12.5 cm	5 "
(11)	Pean's hemostats, without teeth, 14.5 cm	5 "
(12)	Mosquito artery forceps, curved, 12.5 cm	5 "

(13)	Mathieu's needle holder, 19 cm	2 pcs
(14)	Hegar's needle holder, 16 cm	2 "
(15)	Langenbeck's retractor, 1.3 x 4 cm	1 pair
(16)	Ditto , 2.5 x 6 cm	1 "
(17)	Ditto , 11 x 4 cm	1 "
(18)	Malleable retractor, large & medium	1 set
(19)	Abdominal retractor, large	1 pair
(20)	Ditto , small	1 "
(21)	Probe, 24 cm	1 pce
(22)	Deschamp's ligature needles	1 pair

18. Gynaecological vaginal instruments set — 3

In stainless steel case.

Contents:

(1)	Cusco's vaginal speculum, chrome plated, set of 3 sizes	1 set
(2)	Kristeller's vaginal speculum, set of 3 sizes	1 "
(3)	Adzuma vaginal speculum, for drainage, set of 3 sizes	1 "
(4)	Simon vaginal retractor, set of 3 sizes	1 "
(5)	Skene uterine valsellum forceps	2 pcs
(6)	Schroeder-Braun uterine tenaculum	2 "
(7)	Simpson uterine sound	2 "

19. Orthopedic operating set — 2

Contents:

(1)	Kodama's orthopedic operating set, in wooden case	1 set
(2)	Jewett nail and plate set, in metal case	2 sets
(3)	K-U plate and screw set, in metal case	2 "
(4)	Accessories set for K-U plate, in metal case	2 "
(5)	M-type compression plate set, in metal case	2 "
(6)	Gypsum cutter, electric, with three 6 cm dia. blades	1 set
(7)	Arthroplastic chisel, gouge and osteotome set, stainless steel, set of 19 pcs in case	1 "

20.	Instrument tray table, 130L x 45W x 80H cm, stainless steel, with three fan-shaped trays, caster dia. 5 cm	4
21.	Spare fan-shaped tray, stainless steel	8
22.	Mayo instrument stand, stainless steel, with 50 x 30 cm tray, caster 5 cm dia., height adjustable	4
23.	Spare rectangular 50 x 30 cm tray, stainless steel	6
24.	Instrument table, 60L x 45W x 75H cm, stainless steel, with guardrail and 5 cm dia. casters.	4
25.	Double basin stand, stainless steel, with two stainless steel basins	4
26.	Foot stool, two steps, stainless steel frame	4
27.	Operating chair, oil hydraulic height adjustable from 50 to 70 cm, with anti-static rubber-tyred castors and back rest.	2
28.	Operating stool, all stainless steel, height adjustable 42 to 71 cm.	4
29.	Kick bucket, stainless steel, dia. 42 cm	4
30.	Dressing drum, stainless steel, dia. 36 cm	4
31.	Ditto , dia. 27 cm	6
32.	Ditto , dia. 18 cm	6
33.	Waste receptacle, with foot pedal, stainless steel, dia. 24 cm.	4
34.	Dressing drum stand, for dia. 27 cm drum, stainless steel	4
35.	Pus basin, stainless steel, L,M,S	each 8

36.	Electric dermatome, graft cuts from 4 to 7 cm in width and from 0.3 to 1.5 mm in thickness, complete with motor unit, dermatome unit, 3 blades, nut driver, chuck spanner, chuck handle and cord.	1
37.	Low pressure continuous suction unit, suction force max. 250 mm H20, wide mouth suction bottle 3000 cc x 1 pce, complete with accessories and 1 spare bottle.	5
38.	Brush sterilizer, stand type, for 20 brushes, complete with 50 brushes.	2
39.	Soap dispenser, wall type, connected with foot pedal.	2
40.	Irrigator stand, double hooks, mounted on casters, height adjustable, stainless steel.	4

B) X-Ray Department

1. 500 mA X-Ray Diagnostic Apparatus including integrated radiographic/tomographic table enabling to change 3-speed liner tomography or zonography and providing layer depth indicator with digital display — 1

Consisting of:

(1) X-Ray generator incorporating new electrical control circuits and an original power switching device which are all of solid-state type — (1 set)

1) Single phase X-Ray generator & control

2) Rating: radiographic 500 mA at 120 kV
300 mA at 150 kV
fluoroscopic 4 mA at 120 kV

3) Radiographic timer is 0.01 to 10 seconds in 23 steps

4) Respective value of kV, mA, sec is displayed by 3-figures digital on the control panel

(2) Integrated radiographic/tomographic table enabling to change 3-speed linear tomography or zonography and providing layer depth indicator with digital display — (1 set)

1) X-Ray tube stand is integrated with the table

2) Tomography angle: selectable from 8°, 20° and 40°

3) Tomography speed: 75 mm/sec for only 8° zonography, slow: 100 mm/sec, fast: 200 mm/sec for 20° or 40° tomography

4) Layer depth range: 0 — 240 mm with 1 mm increments, by motor drive

5) Table top travel

° Logitudinal: Approx 60 cm to the left, Approx 50 cm to the right

° Transverse: Approx ±12 cm

6) Bucky travel: Approx 55 cm

7) Horizontal travel of tube stand: Approx 878 mm

8) Vertical travel of X-Ray tube: Approx 730 mm to 1,815 mm above floor

9) Table bucky gid: 40", 8:1, 85 LP

(3) X-Ray tube unit with H.T. cable (15 m length) (1 set)

1) Focal spot : 1.0/2.0 mm
2) Max R-KV : 150 kV
3) Heat storage: 200,000 HU
4) Target angle: 16°
5) Max Rating : 50/90 kW

(4) High speed starter (1 set)

(5) Vertical bucky stand without a cassette size sensor (1 set)

1) Cassette tray loading possible from right or left
2) Height of column: 190 cm
3) Width of column : 30 cm
4) Front-panel-to-film distance: 32 mm
5) Built-in counterweight and dual wire-rope system
6) Compatible cassette size: 10" x 12", 11" x 14", 14" x 14", 14" x 17"
7) Applicable exposure time: 0.01 - 6 sec. when using the grid of 8:1, 34 lines/cm Al interspacer
8) Grid movement: oscillating system by spring mechanism

(6) Auto exposure control for table bucky and vertical bucky stand enabling the exposure time necessary for the optimum film density to be automatically controlled (1 set)

1) Minimum exposure time: 1/120 sec under 60 Hz
2) Reproducibility: less than 0.045
3) The detectors are composed of semiconductor X-Ray detecting field elements and shaped very thin
4) It is all of all solid-state and has various compensation circurity

(7) Complete with spare parts for one year

2. Diagnostic X-Ray mammography unit enabling to make 2X magnification mammography and having three phase, 6 pulse Generator and X-Ray tube unit of molybdenum target and 100 μm microfocal spot 1

(1) Permitted ratings

1) Large focus 50 mA at 49 kV, 100 mA at 35 kV
2) Small focus 10 mA at 40 kV, 15 mA at 30 kV

(2) Phototimed exposure control density selection (5 steps) is provided.

(3) It is utilized for high-capacity repetitive mammography (4 mammograms/2 minutes).

(4) 4 pcs of 8" x 10" cassette with screen for contact and 2 pcs of 11" x 14" cassette with screen for magnification are included.

(5) Tube assembly movement

1) Electromagnetic locks for all motions
2) Vertical travel : 80 cm, motor-driven
3) Formal and backward : 18 cm, manual
4) Right and left : ±8 cm, manual
5) Rotation : ±170°, manual

(6) Complete with spare parts for one year

3. High capacity 100 kV mobile X-Ray unit 2

(1) Capacity : 1 micro Farad

(2) Maximum charging voltage : 100 kV

(3) Maximum X-Ray tube current : 320 mAP with 2.0 mm focal spot

(4) X-Ray tube moving range :
Vertical 200 mm to 2,085 mm
Horizontal 1,065 mm to 1,295 mm

(5) Equipped with automatic charging and wave-tail cut-off circuits

(6) Smooth and easy handling is possible of the support and movement mechanisms.

(7) Max size and number of cassettes stored

14" x 17"	3 pcs
11" x 14"	4 pcs

(8) Complete with spare parts for one year

4. X-Ray Sundries & Dark Room Set 1

Contents:

(1) Developing tank w/spare parts 1 set

Practicable sizes	: Up to 14" x 17"/frame
Circulation/Temp. control for DEV tank	: Circulation by pump, temperature control by thermo-module for heating and cooling
Heating or cutwater tank	: By remaining heat from electronics + additional small fan-heater
Tank volumes	: DEV 15 liters (8 x 37 x 52 cm) FIX 20 liters (26 x 37 x 52 cm) WASH 60 liters (10 x 37 x 52 cm) CUTWATER (12 x 37 x 52 cm)
Power supply	: 240 V 50 Hz, 600 VA
Dimensions	: 64 W x 58 D x 93 H cm

(2) PL type cassette, 14" x 17" 15 pcs
Ditto, 14" x 14" 15 "
Ditto, 10" x 12" 15 "
Ditto, 8" x 10" 15 "

(3) HS type intensifying screen, 14" x 17" 15 "
Ditto, 14" x 14" 15 "
Ditto, 10" x 12" 15 "
Ditto, 8" x 10" 15 "

(4) Protective apron, leaded cloth 0.5 pb, 100 x 55 4 "

(5) Protective gloves, 0.33 pb, length: 33.5 cm 4 "

(6) Protective goggles 4 "

(7) Film marker, radiography English 4 sets

(8) Chest measure calipers, 43 cm max. 4 pcs

(9) Film preserve chest, 1.0 pb wooden, 53 x 21.5 x 47 cm 2 "

(10) Film loading desk, 100 W x 55 D x 85 H cm 1 set

(11) Safe-light lamp, single face filter 2 sets

(12)	Suspension type sun lamp	1	pce
(13)	Darkroom timer, wall type	1	"
(14)	Corner cutter	1	"
(15)	Poly-tank, 20 liters	4	pcs
(16)	Film hanger, stainless steel, 14" x 17"	20	"
	Ditto, 14" x 14"	20	"
	Ditto, 10" x 12"	20	"
	Ditto, 8" x 10"	20	"
(17)	Film hanger rack	4	"
(18)	Liquid thermo meter, 50°C	3	"
(19)	X-Ray grid, MS, 5:1, 14" x 17"	2	"
	Ditto, 14" x 14"	2	"
	Ditto, 10" x 12"	2	"
	Ditto, 8" x 10"	2	"

5. Instrument for installation 1

Contents:

(1)	Digital volt meter	1
(2)	Osiloscope	1
(3)	Cycle counter	1
(4)	Megger	1
(5)	MAP meter	1
(6)	KVP meter	1
(7)	R-MA meter	1
(8)	Primary voltage meter	1
(9)	AC volt meter	1

C) **Clinical Investigation Unit**

1.	4-channel polygraph		2
	Consisting of:		
	(1)	4-channel memoryscope	1
	(2)	4-channel amplifier housing case	1
	(3)	Housing case	1
	(4)	Mobile cart	1
	(5)	Heart rate unit	1
	(6)	Respiration rate unit	1
	(7)	Blood pressure unit	1
	(8)	Temperature unit	1
	(9)	DC amplifier unit	1
	(10)	4-channel thermal-writing oscillograph	1
	(11)	4-channel head amplifier housing case with universal holder	1
	(12)	ECG head amplifier	1
	(13)	ECG input cord	1
	(14)	Disposable electrode (50 pcs/set)	1
	(15)	Temperature head amplifier	1
	(16)	Rectum temperature pickup	1
	(17)	Skin temperature pickup	1
	(18)	Strain head amplifier	1
	(19)	Blood pressure transducer	2
	(20)	Blood pressure transducer stand	1
	(21)	Flushing system for blood pressure head	1
	(22)	Consumables (50 recording paper, 1000 disposable electrodes, 25 disposable dome kits, 5 thermal pens)	1
2.	Blood flow meter		1
	Consisting of:		
	(1)	Peri arterial probe	4
	(2)	Cannula ping probe	4
	(3)	Handle probe	1
	(4)	Recorder	1
	(5)	Recording paper	50

3.	pH meter, digital display, range: pH 0.00 - pH 14.00, 0 - 1999mV, 0 - 50°C, complete with accessories. Spare parts & consumable: 2 electrode, 5 buffer solution pH 4.01 (500 ml), 5 buffer solution pH 6.86 (500 ml) 5 KCl solution (100 ml)	2
4.	Infusion pump, volume of infusion: 1.19 - 19.02 ml/hr, 5 steps, with 500 disposable syringes (20 ml).	2

D) Anesthesia and Resuscitation Department

1. Anesthesia Apparatus 2

Anesthesia apparatus incorporating with volume preset & time cycling system ventilator; two flowmeters with safety mechanism for N20, 02: 0.1 - 10 L, N20: 0.1 - 10 L; double chamber canister with capacity of 2,000cc; large & circular sphygmomanometer up to 300mmHg; pressure manometer for checking the piping pressure; pin-index auxiliary cylinder yokes equipped; ventilation circuit equipped with assistor & plateau mechanism; Tidal volume: 200 - 1,300ml; Frequency: 3 - 35 times/min; Trigger sensitivity: -10cmH20; I/E ratio: 1:1, 1:1.5, 1:2 3 steps;
Each set consisting of: 1 x anesthesia apparatus with built-in ventilator, 1 x Fluothane vaporizer, 2 x pin-index gas cylinder, 2 x 40.2 L gas cylinder with reducing valve & 3,6 M pressure tube & cylinder truck; Complete with the following spare parts for one year.

Spare parts:	(1)	Dome cap for I/E valve	2
	(2)	I/E valve	2
	(3)	Gaskets, various	1 set
	(4)	Bellows	1

2. Portable defibrillator, consist of defibrillator unit, ECG measuring unit and memoryscope unit, heated stylus recorder unit, mobile cart. 2
Consumables: 30 recording paper, 10 heat stylus, 1 ECG electrode set, 5 ECG paste

3. Oxygen analyzer, range: 0 - 100% ±2%, response time: less than 20 seconds, with 2 spare cells. 1

4. Universal Ventilator 2

Volume pre-set & time cycling system ventilator with standard accessories, including controlled & controlled/ assist modes, CMV mode, IDV mode, Plateau mechanism,

PEEP, Sign function, CPAP mechanism, and Manual breathing; Visual & audible safety signals for leak in circuit, excess pressure, so on; Minute volume: 3 - 30 L/min.; Tidal volume: 200 - 1,500ml; Breathing frequency: 6 - 40 times/min.; I/E ratio: 3:1 - 1:5; IDV breathing frequency: 0 - 10 times/min.; Oxygen concentration: 21 - 100%; PEEP & CPAP: 0 - 20 cmH2O; complete with the following spare parts for one year.

Spare parts:	(1)	Bacteria filter	2
	(2)	Filter for air-inlet	5
	(3)	Drain cup	1
	(4)	Bellows	1
	(5)	Gaskets & Diaphragms	1

5. Laryngoscope, Macintosh type, complete with handle, blades (4 sizes) and 5 spare bulbs. 4

6. Sphygmomanometer, stand type, complete with accessories. 4

7. Suction unit, table type, vacuum 750mm/Hg and capacity 24 1/min, suction bottle 500cc x 2 pcs, complete with accessories and 2 spare bottles. 1

8. 1 Channel portable electrocardiograph, complete with cart and the following consumables. 1
Consumables: 300 rolls recording paper, 192 keratin cream (70g/tube), 5 stylus, 5 pre-amplifier PC board, 5 lead selector, 30 chest electrodes, 20 limb electrodes, 20 limb electrode straps.

9. Blood warmer, for dia. 5mm transfusion tube, with temperature control system, 240V 50Hz. 3

10. Infusion pump, volume of infusion: 1.19 - 19.02 ml/hr, 5 steps, with 500 disposable syringes (20ml). 3

E) Pharmacy Department

1. Pharmaceutical refrigerator, capacity 500 liters, stainless steel cabinet, operating amb. temp. -10°C to 35°C. — 1

2. Analytical balance, automatic electronic type, capacity 200 gram, display resolution 0.1mg, 240V 50Hz. — 1

3. Automatic distillation apparatus, distillation capacity 1.8 l/h, distilled water storage tank 30 liters, deionized water storage tank 15 liters, ion exchange resin: cartridge type, raw water filter: sponge plastic filter, with stand and the following spare parts.
Spare parts: 2 cartridge type ion exchange resin, 3 sponge plastic filters. — 1

4. High pressure steam sterilizer, table top type, stainless steel chamber. (30cm dia. x 45cm), complete with 2 trays. — 1

5. Pharmacy Instruments Set — 1
Contents:

(1)	Wire gauze	2 pcs
(2)	Graduate, conical, glass, 20ml	2 "
(3)	Ditto , 50ml	2 "
(4)	Ditto , 100ml	2 "
(5)	Tripod	2 "
(6)	Test tube, ϕ18mm	30 "
(7)	Test tube stand, for 12	3 "
(8)	Dropping bottle, clear, 30ml	3 "
(9)	Mortar, with pestle, porcelain, 120mm	3 "
(10)	Ditto , 150mm	3 "
(11)	Beaker, glass, 100ml	5 "
(12)	Flask, flat bottom, 100ml	3 "
(13)	Alcohol lamp	2 "
(14)	Bunsen gas burner	1 pce

(15)	Measuring pipette, 1ml	3 pcs
(16)	Volumetic flask, glass, 100ml	2 "
(17)	Graduated cylinder, glass, 100ml	2 "
(18)	Spoon, stainless steel, set of 3	1 set
(19)	Crucible tongs	1 pce
(20)	Funnel, glass, 90ϕmm	1 "
(21)	Ditto , 60ϕmm	1 "
(22)	Spatura	2 pcs
(23)	Reagent bottle, plain, 250ml	50 "
(24)	Ditto , amber, 250 ml	50 "
(25)	Sieves, set of 7	1 set

F) **Medicine Department**

1. Weighing scale, double face type, capacity 150 kg, sensitivity 500 gm — 1

2. Diagnostic Instruments Set — 3

Contents:

(1)	Littmann stethoscope, "3M" Model 2102	1 pce
(2)	Head mirror	1 "
(3)	Clinical thermometer	10 pcs
(4)	Measuring tape	1 pce
(5)	Lucae tuning fork	1 "
(6)	Tongue depressor, set of 5	1 set
(7)	Anesthesiometer	1 pce
(8)	Percussion hammer, Babinski's	1 "
(9)	Stop watch	1 "
(10)	Tongue depressor, Fraenkel's	2 pcs
(11)	Loupe	1 pce
(12)	Finger sterillizer	1 "
(13)	Nasal speculum, Hartmann's, set of 3 sizes	1 set
(14)	Dressing forceps, without teeth, 13cm	2 pcs
(15)	Lucae nasal forceps	1 pce
(16)	Mouth gag, Heister's	2 pcs
(17)	Lucae cotton applicator	10 "
(18)	Hartmann's laryngeal cotton applicator	2 "
(19)	Sterilizing jar stand	1 pce
(20)	Pen light with 2 spare lamps	1 "
(21)	Diagnostic instruments case	1 "

3. Diagnostic Set — 3

Used of diagnosis of eye, ear, nose, and throat, in case.

Contents: Halogen ophthalmoscope head, Otoscope with 3 specula (3mm, 5mm, 7mm), Laryngoscope, Tongue depressor, C cell battery handle, Spare bulb for Ophthalmoscope (halogen), Spare bulb for Otoscope, Laryngoscope.

4.	Pus basin, stainless steel, L,M,S	each 5
5.	Irrigator stand, double hooks, mounted on casters, height adjustable, stainless steel.	5
6.	3 channel automatic electrocardiograph, complete with accessories and cart. Consumables: 100 recording paper, 192 ECG cream, 10 stylus, 30 chest electrode, 20 clip type electrode.	1
7.	1 Channel portable electrocardiograph, complete with cart and the following consumables. Consumables: 300 rolls recording paper, 192 keratin cream (70g/tube), 5 stylus, 5 pre-amplifier PC board, 5 lead selector, 30 chest electrodes, 20 limb electrodes, 20 limb electrode straps.	1
8.	Infusion pump, 2 syringes type, volume of infusion: 0.59 - 9.51 ml/hr, 5 steps, with 500 disposable syringes (20ml).	2
9.	Menghini's biopsy needle, stainless steel.	10
10.	Silverman biopsy needle, stainless steel.	10
11.	Abrams pleural biopsy punch.	10
12.	Martin aspirator, consisting of 20ml syringe, 3-way stopcock, trocar and cannula, and exploring needle.	5
13.	Osmometer, by measuring the freezing point of the liquid, digital indication, range: 0 - 1999 mOsm/kg, complete with spare parts and consumable for one year.	1
14.	Digital type scale bed, weight measurement range: max. 120kg, indication unit: 10g unit, head and foot reclining.	2
15.	Parallel plate dialyzer with tubing, fit to "REDY".	200

16.	Hollow fiber dialyzer with tubing, fit to "REDY".	200
17.	Sorb cartridge, fit to "REDY".	400
18.	Disposable transducer filter, fit to "REDY"	200

G) **Outpatient Department**

1. Weighing scale, double face type, capacity 150kg, sensitivity 500gm. — 1

2. Blood sedimentation set, Westergren type, complete with 1 rack and 10 pipettes.
   Spare parts: 100 pipettes. — 1

3. Hemacytometer, improved Neubauer type, complete with counting chamber, two cover glasses, and red and white diluting pipettes, in plastic case. — 5

4. Hematocrit centrifuge, max. speed 12000 r.p.m. max. force 14800 x G, capacity: 20 capillary tubes and 15ml x 4, complete with hematocrit rotor. — 1

5. Clinical refractometer, serum protein scale: 0 - 12g/dl, urine specific gravity scale: 1.000 - 1.050, refractive index scale : 1.333 - 1.360. — 1

6. Diagonostic Set — 3

   Used of diagnosis of eye, ear, nose, and throat, in case.
   Contents: Halogen ophthalmoscope head, Otoscope with 3 specula (3mm, 5mm, 7mm), Laryngoscope, Tongue depressor, C cell battery handle, Spare bulb for Ophthalmoscope (halogen), Spare bulb for Otoscope, Laryngoscope.

7. Diagnostic Instruments Set — 3

   Contents:

(1)	Littmann stethoscope, "3M" Model 2102	1 pce
(2)	Head mirror	1 "
(3)	Clinical thermometer	10 pcs
(4)	Measuring tape	1 pce
(5)	Lucae tuning fork	1 "
(6)	Tongue depressor, set of 5	1 set
(7)	Anesthesiometer	1 pce

(8)	Percussion hammer, Babinski's	1 pce
(9)	Stop watch	1 "
(10)	Tongue depressor, Fraenkel's	2 pcs
(11)	Loupe	1 pce
(12)	Finger sterillizer	1 "
(13)	Nasal speculum, Hartmann's, set of 3 sizes	1 set
(14)	Dressing forceps, without teeth, 13cm	2 pcs
(15)	Lucae nasal forceps	1 pce
(16)	Mouth gag, Heister's	2 pcs
(17)	Lucae cotton applicator	10 "
(18)	Hartmann's laryngeal cotton applicator	2 "
(19)	Sterilizing jar stand	1 pce
(20)	Pen light with 2 spare lamps	1 "
(21)	Diagnostic instruments case	1 "

8. Research binocular microscope, "OLYMPUS" Model BHS-113 standard set or equivalent, with 2 spare lamps. — 1

9. High pressure steam sterilizer, table top type, stainless steel chamber. (30cm dia. x 45cm), complete with 2 trays. — 1

10. Urine Test Instruments Set — 1

Contents:

(1)	Slide glass, polished, 500/pack	1 pack
(2)	Cover glass, 18 x 18, pack of 1000	1 "
(3)	Pasteur pipet, 9", pack of 1000	1 "
(4)	Pasteur bulb, pack of 10	1 "
(5)	pH test paper, roll	5 pcs
(6)	Uro. test paper, pack of 100	10 packs
(7)	Urinometer	2 pcs
(8)	Gas burner set	1 set
(9)	Test tube clamp, wooden	2 pcs
(10)	Dropping bottle, amber, 60cc	3 "
(11)	Pipet drop bottle, 120cc	3 "
(12)	Bottle with stopcock, 20 liters	1 pce
(13)	Centrifuge tube stand, 18ø x 50pcs	2 pcs

(14)	Ostwald-Folin pipet, 0.1cc, pack of 10	2 packs
(15)	Ditto , 0.2cc	2 "
(16)	Ditto , 0.5cc	2 "
(17)	Ditto , 1cc	2 "
(18)	Measuring pipet, 1cc, pack of 10	2 "
(19)	Ditto , 5cc	2 "
(20)	Ditto , 10cc	2 "
(21)	Para film	2 pcs
(22)	Plastic basket	1 pce
(23)	Plastic bucket, 10 liter	1 "
(24)	Stainless steel basket, 20 x 20 x 20	3 pcs
(25)	Rubber glove	3 "
(26)	Regent bottle, 120cc, plain and amber	3 each
(27)	Ditto , 250cc	3 "
(28)	Ditto , 500cc	3 "
(29)	Ditto , 1000cc	2 "
(30)	Forceps, 30cm	1 pce
(31)	Ditto , 15cm	2 pcs
(32)	Brush for beaker, test tube & bottle	5 each
(33)	Pipet case	1 pce

H) Obstetric and Gynaecological Department

1. Gynaecological examining table, oil hydraulic by foot pedal, back and seat section incline, complete with heel holder. "ATOM", "NAKAMURA" or equivalent. 1

2. Obstetric delivery bed, oil hydraulic by foot pedal, complete with supplementary table. "NAKAMURA", "ATOM" or equivalent. 2

3. Infant warmer, stand type, height adjustable, mounted on caster with stoppers. 3

4. Automatic resuscitator, for new born and adult, oxygen inhalation/resuscitation, continuous supply of humidified oxygen suctioning, complete with 2 oxygen cylinders (500 liters). 2

5. Infant incubator 3
"ATOM" Model V-80MC, "NAKAMURA" Model H-800 PS or equivalent, complete with spare parts for one year use.

6. Phototherapy unit, stand type, height adjustable, with a cooling ventilation fan, mounted on caster. Spare parts: 5 luminescent bulbs. 2

7. Infant bassinet, with inclining device, steel chrome-plated frame complete with basket and mattress. 5

8. Miller's laryngoscope, for infant, contents: 1 handle, 3 sizes baldes, 5 bulbs, 2 batteries. 5

9. Baby scale, plastic, scale reading: 20 to 75cm. 2

10. Infant automatic scale, capacity: 10 kg, sensitivity: 20g.

11. Infusion pump, volume of infusion: 2.39 - 0.97 ml/hr, 5 steps, with 500 disposable syringes (20 ml) 3

12. Obstetrical Instruments Set 5

In metal case.

Contents:

(1)	Naegale obstetrical forceps	1 pce
(2)	Braun cranioclast	1 "
(3)	Naegele perforator	1 "
(4)	Mensnard bone forceps	1 "
(5)	Braun decapitation hook	1 "
(6)	Martin obstetric hook and crotchet	1 "
(7)	Uterine dressing forceps	1 "
(8)	Muzeux tenaculum forceps	1 "
(9)	Muzeux vulsellum forceps	1 "
(10)	Uterine tissue forceps	1 "
(11)	Uterine scissors, straight	1 "
(12)	Ditto , curved	1 "
(13)	Kocher hemostatic forceps	3 pcs
(14)	Pean hemostatic forceps	3 "
(15)	Umbilical scissors	1 pce
(16)	Pelvimeter	1 "
(17)	Tracheal catheter	1 "
(18)	Linen measuring tape	1 "
(19)	Bozeman uterine douch	1 "
(20)	S-shaped catheter	1 "
(21)	Abortive forceps	1 "
(22)	Placenta curette	1 "
(23)	Umbilical card inserter	1 "
(24)	Invision tape	1 "
(25)	Noose guide	1 "
(26)	Roser needle holder	1 "
(27)	Thumb dressing forceps	1 "
(28)	Suture needle container	1 "
(29)	Martin suture needle	6 pcs
(30)	Hank of sutures	2 "
(31)	Chloroform dropping bottle	1 pce
(32)	Chloroform inhaling mask	1 "
(33)	Tongue forceps	1 "
(34)	Dressing forceps	1 "

13.	Doppler fetus detector, ultrasonic frequency 5MHz, ultrasonic output: less than 10mW/cm^2, with 3 spare batteries.	1
14.	Irrigator stand, double hooks, mounted on casters, height adjustable, stainless steel.	5
15.	Oxygen head box for infant.	3
16.	Baby stethoscope, 2 head type.	5
17.	Vacuum extractor, 2 suction bottles, complete with accessories and 2 spare bottles.	1
18.	Suction unit, vacuum 0 to 500mmHg, 1000cc suction bottle, complete with stand.	2
19.	Wheel chair, for adult, solid rubber tire	2
20.	Infant CPAP system, with oxygen analyzer, complete set.	1
21.	Amnioscope, complete with 3 guide cylinders, battery handle and 2 spare lamps.	1
22.	Oxygen analyzer, range: 0 - 100% ±2%, response time: less than 20 seconds, with 2 spare cells.	1
23.	Clinical sheets, 37W cm x 36L m.	100
24.	Amniotic fluid suction catheter, sterile	1000
25.	Umbilical cord clamp, sterile.	1000
26.	Pediatric urine collector, disposable, sterile.	3000

l) Mortuary Department

1.	Suspension scale, capacity 4 kg.	1
2.	Autopsy Instruments Set In wooden case. Contents:	1
(1)	Dissecting knife	6 pcs
(2)	Cartilage knife	1 pce
(3)	Amputation knife	1 "
(4)	Brain sectioning knife	1 "
(5)	Razor with sheath	1 "
(6)	Dissecting forceps	3 pcs
(7)	Dissecting scissors	1 pce
(8)	Probe end dissecting scissors	1 "
(9)	Enterotomy scissors	1 "
(10)	Bone cutting forceps	1 "
(11)	Rib shears	1 "
(12)	Bone holding forceps	1 "
(13)	Grooved probe	1 "
(14)	Bougies (large & small)	2 pcs
(15)	Rachiotomy saw with double blades	1 pce
(16)	Frame saw	1 "
(17)	Skull breaker	1 "
(18)	Chisel	1 "
(19)	Wooden mallet	1 "
(20)	Double end four prong retractors	3 pcs
(21)	Blow pipe with stopcock	1 pce
(22)	Folding metal rule	1 "
(23)	Glass graduate 100cc	1 "
(24)	Suture needles	3 pcs
3.	Autopsy light, stand type, lamphead: dia. 60cm, light intensity: 25000 lux, mounted on caster.	1
4.	Mortuary carriage, all stainless steel, dia. 25cm caster.	1

J) Pathology Museum

1.	Electric sander	1
2.	Jig saw, with 10 spare blades	1
3.	Refrigerator, capacity: approx. 310 liters.	1

K) Endoscopy Department

1. Gastrointestinal Fiberscope 1

Contents:

(1)	Gastrointestinal fiberscope with standard accessories GIF-P3	1
(2)	Biopsy forceps, ellipsoid (fenestrated) FB-21K	1
(3)	Biopsy forceps, standard type (fenestrated) FB-19K	1
(4)	Biopsy forceps, alligator jaws FB-15K	1
(5)	Diathermic snare, crescent SD-7P	1
(6)	Diathermic snare, hexagonal SD-8P	1
(7)	Coagulation electrode, ball point CD-5P	1
(8)	Grasping forceps, W-shape FG-4L	1
(9)	Grasping forceps, rat tooth FG-14P	1
(10)	Grasping forceps, basket type FG-17K	1

"OLYMPUS" Gastrointestinal Fiberscope or equivalent.

2. Duodenofiberscope 1

Contents:

(1)	Duodenofiberscope with standard accessories JF-B4	1
(2)	Papillotomy knife, pull type KD-4Q	1
(3)	Papillotomy knife, pull type KD-5Q	1
(4)	Papillotomy knife, pull and push type KD-6Q	1
(5)	Cannula, standard type PR-4Q	1
(6)	Cannula, indwelling type PR-5Z	1
(7)	Grasping forceps, basket type FC-18Q	1

"OLYMPUS" Duodenofiberscope or equivalent.

3. Colonofiberscope 1

Contents:

(1)	Colonofiberscope with standard accessories CF-1TL	1
(2)	Biopsy forceps with needle (fenestrated) FB-24U	1
(3)	Diathermic snare, crescent SD-5U	1
(4)	Diathermic snare, hexagonal SD-6U	1
(5)	Grasping forceps, alligator jaws FG-7U	1

(6)	Grasping forceps, rat tooth FG-9U	1
(7)	Grasping forceps, pelican type FG-12U	1
(8)	Grasping forceps, tripod type FG-15U	1
(9)	Grasping forceps, basket type FG-16U	1
(10)	Coagulation electrode, ball point CD-2U	1
(11)	Coagulation electrode, suction type CD-4U	1

"OLYMPUS" Colonofiberscope or equivalent.

4. Bronchofiberscope 1

Contents:

(1)	Bronchofiberscope with standard accessories BF-B3R	1
(2)	Cytology brush, standard type BC-10C	1
(3)	Cytology brush, with sheath BC-5C	1
(4)	Cytology brush, double-joint BC-8C	1
(5)	Grasping forceps, W-shape FG-4L	1
(6)	Grasping forceps, rat tooth FG-14P	1

"OLYMPUS" Bronchofiberscope or equivalent.

5. High intensity cold light supply, "OLYMPUS" Model CLV or equivalent, with 3 spare lamps. 1

6. Electro surgical unit, "OLYMPUS" Model UES or equivalent, complete with accessories. 1

7. Cart for endoscopes, for 4 endoscopes or 2 light guide cables, and fiber light source, stainless steel. 2

8. Endoscope closet, 12 fixed hangers and 15 removal hangers, with bactericidal lamp, stainless steel, 90W x 45D x 190H cm. 1

L) Histopathology, Haematology & Chemical Department

1. High pressure steam sterilizer, table top type, stainless steel chamber. (30 cm dia. x 45 cm), complete with 2 trays. — 1

2. Drying oven, temperature range: 40°C - 200°C, stainless steel chamber, chamber size: 45 W x 40 D x 40 H cm — 2

3. Refrigerated centrifuge, capacity: 50 ml x 12 tubes, 15 ml x 60 tubes, 3,500 r.p.m., 2,670 x G, swing rotor, complete with accessories and the following spare parts. — 2
   Spare parts: 50 ml glass tubes x 100
   15 ml glass tubes x 400

4. Table top centrifuge, automatic control system, 3,500 r.p.m., 15 ml x 40 pcs, 30 min. automatic reset timer, complete with 1 swing rotor, 4 metallic case for 50 ml tube, 4 resin case for eight 15 ml tubes. — 3

5. Micro high speed centrifuge, max. speed 12,000 r.p.m. max. force 11,300 x G, complete with micro angle rotor (1.5 ml x 12), hematocrit rotor and 200 spare micro tubes (1.5 ml) — 1

6. Precision balance, top loading, capacity: 200 gm, scale interval: 1 mg, 6-digit 7-segment display, 240 V 50 Hz. — 2

7. Automatic distillation apparatus, distillation capacity 1.8 l/h, distilled water storage tank 30 liters, deionized water storage tank 15 liters, ion exchange resin: cartridge type, raw water filter: sponge plastic filter, with stand and the following spare parts. — 1
   Spare parts: 2 cartridge type ion exchange resin
   3 sponge plastic filters

8.	Thin layer chromatograph		2
	Consist of:		
	(1) Spreader (250μ, 500μ, 750μ, 1,000μ, 1,250μ, 1,500μ, 1,750μ, 2,000μ)	1 set	
	(2) Glass plate, 200 x 200 mm (8 pcs/set)	1 "	
	(3) Ditto, 50 x 200 mm (8 pcs/set)	2 sets	
	(4) Parallel plate	1 set	
	(5) Spot cover	1 "	
	(6) Drying shelf frame	1 "	
	(7) Cabinet case	1 "	
	(8) Chamber	1 "	
	(9) Spreader 250μ	1 "	
	(10) Sandwitch type chamber	1 "	
9.	Biopsy instrument for bone marrow		5
10.	Automatic blood cell counter, WBC/RBC/Hgb/Hct, sample volume: 40 μl whole blood per 20 ml diluent, digital display, with consumable for one year		1
11.	Freezing microtome, temperature range: 0°C—35°C, all sealed type refrigerator, equipped with interior lamp and sterilizing lamp, with spare parts for one year.		1
12.	Automatic slide stainer, rotating type, with spare parts for one year		1
13.	Automatic tissue processor, rotating system, with spare parts for one year		1
14.	Automatic microtome knife sharpener, with spare parts for one year		1
15.	Microprojector, table type, with spare parts for one year		1
16.	Spectrophotometer, consisting of solid state photometer, pipetter diluter and programmed printer, with consumable for one year		1
17.	Refrigerator, capacity: approx. 310 liters		2

18. Photoelectric colorimeter, measuring range: 340 - 950 mμ, min. graduation: 5 mμ, complete with accessories, spare parts and consumable for one year. — 1

19. Incubator, stainless steel chamber, max. temperature 50°C, 3 shelves, inner size: 40 W x 40 D x 45 H cm, complete with automatic thermoregulator and stand. — 2

20. Water bath with thermo regulator, stainless steel, inner size: 50 W x 29 D x 16 H cm — 3

21. Research binocular microscope, "OLYMPUS" Model BHS-113 standard set or equivalent, with 2 spare lamps — 3

22. Trinocular research microscope, "OLYMPUS" Model BHS-313 standard set or equivalent, with 35 mm manual photomicrographic attachment. — 1

23. Flame photometer, range: serum Na 0 - 200 mmol/l K 0 - 9.99 mmol/l, urine Na 0 - 200 mmol/l, K 0 - 150 mmol/l, serum Li 0 - 9.99 mmol/l, digital display, complete with dilutor, printer, and consumable for one year — 1

24. pH meter, digital display, range: pH 0.00 - pH 14.00, 0 - 1,999 mV, 0 - 50°C, complete with accessories. Spare parts & consumable: 2 electrode, 5 buffer solution pH 4.01 (500 ml), 5 buffer solution pH 6.86 (500 ml), 5 KCl solution (100 ml) — 2

25. Large sledge microtome, complete with knife holder and 3 knives. — 1

26. Deep freezer, capacity approx. 370 liters, temperature: -40°C equipped with thermometer, thermo regulator and sub-lid. — 2

27. Electrophoresis apparatus, for cellulose acetate film. consisting of: — 1

    (1) Cellulose electrophoresis vessel, for 20 samples transparent acrylic resin made, platinium electrode (0.4 mm), 22.5 W x 27 D x 5.5 H cm — 1

(2)	Micro pipet with needle, 4 µl, 5 pcs/pack	1
(3)	Vat for staining and decoloration, hard polyethylene made, with lid, 9 W x 25 D x 5 H cm	5
(4)	Special vat for decalin (for transparency), vinyl chloride made, 10 W x 26 D x 5.6 H cm	1
(5)	Cellulose acetate film (CA selector) 6 x 22 cm, 50 sheets/pack	1
(6)	Filter paper for bridge, 8 x 23 cm, 100 sheets/pack	1
(7)	Forceps	2
(8)	Veronal buffer, 2 litters water solution	1
(9)	Buffer, powder for 500 ml	12
(10)	Ponsor 3 R, 500 ml water solution	1
(11)	Decalin, 500 ml	1
(12)	Voltage/current regulator	1

28. Programmable densitometer, object or measurement: blood serum protein, isozyme, lipoprotein etc., material of support: cellulose acetate membrane, agarose film, agar-agar gel etc., equipped with recorder, with spare parts and consumable for one year. 1

29. Blood cell counter, hand tally 3

30. Blood cell calculator, 12 key 1

31. Hemacytometer, improved Neubauer, complete with counting chamber with double Neubauer ruling, two cover glasses, and red and white diluting pipettes, in plastic case. 5

32. Blood gas analyzer, range of display: pH (6 - 8 pH), PCO_2 (5.0 - 250.0 mmHg), PO_2 (0 - 999 mmHg), HCO_3 (0 - 54.0 mmol/l), Total CO_2 (0 - 64.0 mmol/l), BE ($\pm$30.0 mmol/l), complete with spare parts and consumable for one year. 1

33. Histologic Examination Instruments Set 1

Contents:

(1)	Tupperware, No. 3	10 pcs
(2)	Glass bottle with stopcock, 20 liter	1 pce
(3)	Wooden block, L,M,S, pack of 100	5 each
(4)	Paraffin, 1 kg	10 pcs
(5)	Needle attached with wooden handle	5 "
(6)	Dissecting forceps	2 "
(7)	Writing brush	2 "
(8)	Plastic bottle, 500 cc	100 "
(9)	Specimen bottle, 90 x 300	50 "
(10)	Ditto, 180 x 210	50 "
(11)	Forceps for slide glass	5 "
(12)	Slide glass, frosted, polished, 100/pkt.	10 packs
(13)	Cover glass, 18 x 18, pack of 1,000	3 "
(14)	Ditto, 22 x 22, pack of 1,000	3 "
(15)	Ditto, 24 x 32, pack of 1,000	3 "
(16)	Slide holder	10 pcs
(17)	Staining basket	30 "
(18)	Specimen holder case, for 20	100 "
(19)	Slide box, for 100	10 "
(20)	Teflon pack, large, pack of 100	10 packs
(21)	Ditto, middle, pack of 100	10 "
(22)	Ditto, small, pack of 1,000	1 pack
(23)	Specimen adjusting box, for 3,000	2 pcs
(24)	Homogenizer, glass, 20 ml	30 "
(25)	Swab tube, pack of 100	10 packs

34. Biochemistry Ordinary Test Instruments Set 1

Contents:

(1)	Glass lot, 5ϕ x 250 mm	100 pcs
(2)	Pasteur pipet, 9"	1000 "
(3)	Test tube, 13ϕ x 100 mm	1000 "
(4)	Test tube rack, 13ϕ x 50 pcs	5 "
(5)	Billpetter, 20 µl	3 "
(6)	Ditto, 40 µl	3 "
(7)	Ditto, 50 µl	3 "
(8)	Ditto, 100 µl	3 "

(9)	Measuring pipet, 1 cc	30 pcs
(10)	Ditto, 2 cc	30 "
(11)	Ditto, 5 cc	30 "
(12)	Ditto, 10 cc	30 "
(13)	Ditto, 20 cc	10 "
(14)	Transfer pipet, 1 cc	30 "
(15)	Ditto, 2 cc	30 "
(16)	Ditto, 5 cc	30 "
(17)	Ditto, 10 cc	30 "
(18)	Ditto, 15 cc	10 "
(19)	Ditto, 20 cc	10 "
(20)	Ditto, 50 cc	1 pce
(21)	Ostwald-Folin pipet, 0.1 cc	30 pcs
(22)	Ditto, 0.2 cc	30 "
(23)	Ditto, 0.3 cc	30 "
(24)	Ditto, 0.5 cc	30 "
(25)	Ditto, 1.0 cc	30 "
(26)	Komagome pipet, 2 cc	30 "
(27)	Ditto, 5 cc	30 "
(28)	Ditto, 10 cc	10 "
(29)	Rubber pipetter	5 "
(30)	Accupenser, 1 cc	1 pce
(31)	Ditto, 2 cc	1 "
(32)	Ditto, 5 cc	1 "
(33)	Ditto, 10 cc	1 "
(34)	Reagent bottle, narrow mouth, plain and amber, 60 cc	5 each
(35)	Ditto, 120 cc	5 "
(36)	Ditto, 250 cc	5 "
(37)	Ditto, 500 cc	5 "
(38)	Ditto, 1,000 cc	2 "
(39)	Ditto, 2,000 cc	1 "
(40)	Graduated cylinder, 100 cc	10 pcs
(41)	Ditto, 200 cc	5 "
(42)	Ditto, 500 cc	5 "
(43)	Ditto, 1,000 cc	2 "
(44)	Volumetic flask, 500 cc	2 "
(45)	Ditto, 1,000 cc	2 "

(46)	Erlenmeyer flask, 50 cc	10 pcs
(47)	Ditto, 100 cc	10 "
(48)	Ditto, 200 cc	10 "
(49)	Ditto, 500 cc	10 "
(50)	Ditto, 1,000 cc	5 "
(51)	Ditto, 2,000 cc	2 "
(52)	Beaker, 50 cc	10 "
(53)	Ditto, 100 cc	10 "
(54)	Ditto, 200 cc	10 "
(55)	Ditto, 500 cc	10 "
(56)	Ditto, 1,000 cc	5 "
(57)	Graduated cylinder, conical, 20 cc	10 "
(58)	Gas burner set	1 set
(59)	Micro-pipet, jaster, 1,100 VS	3 pcs
(60)	Ditto, 1,100 VM	3 "
(61)	Ditto, 1,100 VL	3 "
(62)	Stop watch	1 pce
(63)	Pocket timer	3 pcs
(64)	Powder papers, large, pkt of 1,000	2 pks
(65)	pH test paper	1 roll
(66)	Para film	5 pcs
(67)	Plastic bucket, 10 liters	1 pce
(68)	Plastic basket	1 "
(69)	Washing bottle, 500 cc	2 pcs
(70)	Polypropylene bottle, with stopcock, 20 l	1 pce
(71)	Beaker, polypropylene, 100 cc	2 pcs
(72)	Ditto, 500 cc	2 "
(73)	Ditto, 1,000 cc	2 "
(74)	Basket, stainless steel, 20 x 20 x 20 cm	1 pce
(75)	Gloves, disposable, large and middle	500 each
(76)	Aspirator	1 pce
(77)	Brush for beaker	30 pcs
(78)	Ditto, for test tubes	30 "
(79)	Ditto, for bottle	30 "
(80)	Pipet washer set	1 set
(81)	Pipet case	1 pce
(82)	Micro-pipet chip, red and blue	1,000 each

(83)	Centrifuge tube, 15 ml	600 pcs
(84)	Ditto, 50 ml	120 "
(85)	Slide glass forceps	1 pce
(86)	Hematoclit tube, plain, pkt of 100	10 pcs
(87)	Interval timer	1 pce
(88)	μ-micron, 5 μl, pkt of 100	10 pcs

35. Blood Examination Instruments Set 1

Contents:

(1)	Blood collecting tube, pack of 500	10 packs
(2)	Blood collecting tube NaF, pack of 500	10 "
(3)	Syringe, 10 ml, pack of 100	50 "
(4)	Venous congestion belt	3 pcs
(5)	Glass jar, amber, 100ϕ mm	3 "
(6)	Glass lot, 5ϕ x 250 mm	50 "
(7)	Slide glass, 3 holes, pack of 100	2 packs
(8)	Hematoclit, Heparin, pack of 2,500	2 "
(9)	Hematoclit, Plain, pack of 2,500	2 "
(10)	Putty, pack of 12	1 pack
(11)	Test tube, 12ϕ x 120 mm	100 pcs
(12)	Test tube rack, 12ϕ x 12 pcs	2 "
(13)	Watch glass, 90ϕ mm	50 "
(14)	Hemacytometer, Thoma	2 "
(15)	Ditto, Burker-Tuerk	2 "
(16)	Ditto, Fuchs-Rosental	2 "
(17)	Cover glass, 24 x 24 x 0.7, pack of 100	10 packs
(18)	Dilting pipet, white	100 pcs
(19)	Ditto, red	100 "
(20)	Ditto, Sahli	100 "
(21)	Pipet holder	150 "
(22)	Pipet washer and drier	1 pce
(23)	Aspirator	1 "
(24)	Beaker, 500 cc	5 pcs
(25)	Blood spreadder	5 "
(26)	Slide glass, frosted, 26 x 76, pack of 500	5 packs
(27)	Slide glass, polished, 26 x 76, 500/pack	5 "
(28)	Cover glass, 18 x 18, 1,000/pack	20 "
(29)	Red pen	3 pcs

(30)	Glass marking scriber, with diamond	2 pcs
(31)	Slide box, for 100	10 "
(32)	Slide rack	6 "
(33)	Staining basket	10 "
(34)	Cylinder, graduate, conical, 20 cc	3 "
(35)	Ditto, 50 cc	3 "
(36)	Immersion oil, 100g	3 "
(37)	Washing bottle, 500 cc	2 "
(38)	Bottle with stopcock, 20 liters	1 pce
(39)	Gloves, disposable, L,M	500 pcs/each
(40)	Komagome pipet, 5 cc	30 pcs
(41)	Ditto, 10 cc	30 "
(42)	Stainless steel tray	1 pce
(43)	Blood sedimentation stand	1 "
(44)	Blood sedimentation tube, pack of 100	20 packs
(45)	Safety pipeter	1 pce
(46)	Interval timer	1 "

M) Microbiology Department

1.	Hot air sterilizer, with electronic thermo-regulator, max. temperature 230°C, stainless steel chamber, inner size: 60W x 50D x 50H cm.	2
2.	Laboratory cart, stainless steel, with 4 removable plastic baskets, mounted on casters.	2
3.	Digesting apparatus, micro Kjeldahl, electric heating, complete with 30ml flask x 6 and manifold. Spare parts: 100 Kjeldahl flasks.	1
4.	Incubator, stainless steel chamber, max. temperature 50°C, 3 shelves, inner size: 40W x 40D x 45H cm, complete with automatic thermo-regulator and stand.	2
5.	Magnetic stirrer, for stirring medium volume of liquid, complete with stirring bars.	1
6.	CO_2 incubator, table type, stainless steel chamber, inner size: 36W x 34D x 33H cm, complete with 6 trays and CO_2 gas cylinder.	1
7.	Digital colony counter, free adjustable magnifying loop, illumination by fluorescent source, reading of colony number by electronic counting system.	2
8.	Clean bench, efficiency: up to 99.97% at 0.3µm, HEPA filter, inner size: 73W x 65D x 57H cm, complete with illuminating lamp and air-duct.	1
9.	Low temperature incubator, temperature range: 0°C - 50°C, stainless steel chamber, inner size: 40W x 40D x 40H cm.	1
10.	Water bath with thermo-regulator, stainless steel, inner size: 50W x 29D x 16H cm, temperature range: 5°C - 80°C.	2
11.	Drying oven, temperature range: 40°C - 200°C, stainless steel chamber, chamber size: 45W x 40D x 40H cm.	1

12.	High pressure steam sterilizer, table top type, stainless steel chamber (30cm dia. x 45cm), complete with 2 trays.	1
13.	Anaerobic jar, glass, capacity: 10 pcs. of vessel, pressure 600mmHg, complete with accessories and catalyst for one year.	3
14.	Automatic distillation apparatus, distillation capacity: 1.8 l/h, distilled water storage tank: 30 liters, deionized water storage tank: 15 liters, cartridge type ion exchange resin and sponge plastic filter, complete with accessories and stand. Spare parts: 2 cartridge type ion exchange resin, 3 sponge plastic filter.	1
15.	Research binocular microscope, "OLYMPUS" Model BHS-113 standard set or equivalent, with 2 spare lamps.	3
16.	Fluorescence microscope, "OLYMPUS" Model BHT-312/ BH-RFL-W-3 or equivalent, with 35mm manual photomicrographic attachment and 2 spare lamps.	1
17.	Trinocular microscope, darkfield, with 35mm manual photomicrographic attachment.	1
18.	Trinocular microscope, phase contrast, with 35mm manual photomicrographic attachment.	1
19.	Precision balance, top loading, capacity: 200 g scale interval: 1 mg, digital display, 240V 50Hz.	1
20.	Slide test rotator, rotating horizontally in 5cm circle, with 30 minute timer, rotating speed: 20 to 200 r.p.m., complete with syphilis test instruments set.	1
21.	Table top centrifuge, automatic control system, 3500 r.p.m., 15ml x 40 pcs, 30 min. automatic reset timer, complete with 1 swing rotor, 4 metallic case	1

for 50ml tube, 4 resin case for eight 15ml tubes.

22. Ultra-low temperature freezer, all stainless steel, chest type, capacity 100 liters, temperature: -85°C, equipped with thermometer, temperature indicator, alarm system, timer, sub-lid, and casters. 1

23. Bacteriology Ordinary Test Instruments Set 1

Contents:

(1)	Petri dish, 90ϕ x 20mm, pack of 100	10 packs
(2)	Ditto , 240ϕ	5 pcs
(3)	Swab tube, pack of 100	10 packs
(4)	Gloves, disposable, L,M, pack of 100	10 "
(5)	Mask, disposable, pack of 100	5 "
(6)	Komagome pipet, 2cc	20 pcs
(7)	Ditto , 5cc	20 "
(8)	Ditto , 10cc	20 "
(9)	Glass lot, 5ϕ x 250mm	100 "
(10)	Forceps, L,M,S	5 each
(11)	Pt needle	10 pcs
(12)	Inoculation loops, dispo. needle, 12/pack	10 packs
(13)	Ditto , 1 µl	10 "
(14)	Ditto , 10 µl	10 "
(15)	Erlenmeyer flask, 1000cc	5 pcs
(16)	Ditto , 2000cc	5 "
(17)	Sterilizing bottle, 100cc	20 "
(18)	Ditto , 200cc	20 "
(19)	Ditto , 500cc	20 "
(20)	Ditto , 1000cc	10 "
(21)	Medicine spoon, L,M,S	2 each
(22)	Powder paper, large	2 packs
(23)	Dispensing balance, 200g	1 set
(24)	Micropipet, Justor, 1100VS	3 pcs
(25)	Ditto , VM	3 "
(26)	Ditto , VL	3 "
(27)	Micropipet tip, blue and red, 1000/pack	1 each
(28)	Graduated cylinder, 100cc	2 pcs

(29)	Graduated cylinder, 500cc	2 pcs
(30)	Ditto , 1000cc	2 "
(31)	Culture tube, 13ϕmm, pack of 500	2 packs
(32)	Ditto , 16ϕmm	2 "
(33)	Ditto , 18ϕmm	2 "
(34)	Culture tube closures, 13ϕ, pack of 500	2 "
(35)	Ditto , 16ϕ	2 "
(36)	Ditto , 18ϕ	2 "
(37)	Ditto , 25ϕ, pack of 100	2 "
(38)	Culture flask, 100cc	200 pcs
(39)	Gas burner set	2 sets
(40)	Glass marking scriber	2 pcs
(41)	Red pencil	2 "
(42)	Slide glass, polished, pack of 500	5 packs
(43)	Cover glass, 18 x 18, pack of 1000	10 "
(44)	Test tube rack, 13ϕ x 50 pcs	3 pcs
(45)	Ditto , 16ϕ x 50	3 "
(46)	Ditto , 18ϕ x 50	3 "
(47)	Stainless steel tray	2 "
(48)	Graduated cylinder, conical, 20cc	2 "
(49)	Ditto , 50cc	2 "
(50)	Forceps for cover glass	2 "
(51)	Conlarge rode, pack of 100	2 packs
(52)	Slide glass, 12 holes	10 pcs
(53)	Ditto , 24 holes	10 "
(54)	Measuring pipet, 1cc	20 "
(55)	Ditto , 5cc	20 "
(56)	Ditto , 10cc	50 "
(57)	Ditto , 20cc	20 "
(58)	Para film	2 "
(59)	Pipet case	1 pce
(60)	Stainless steel basket, 20 x 20 x 20cm	5 pcs
(61)	Automatic spray, 700cc	1 pce
(62)	Aluminum hoil, 10m	10 pcs
(63)	Brush for beaker, test tube and bottle	10 each
(64)	Immersion oil, 100g	2 pcs
(65)	Staining basket, for 15 pcs	10 "

(66)	Washing bottle, 500cc	2 pcs
(67)	Bottle with stopcock, 20 liter	1 pce
(68)	Plastic bucket, 10 liter	1 "
(69)	Culture bottle, 500cc	5 pcs
(70)	Stirring bars, teflon cover, 15mm	10 "
(71)	Ditto , 20mm	10 "
(72)	Pick-up rod, teflon	1 pce
(73)	Erlenmeyer flask, 300cc	20 pcs
(74)	Stop watch	1 pce
(75)	Interval timer	1 "
(76)	Separatory funnel, 100cc	20 pcs
(77)	Ditto , 500cc	12 "
(78)	Ditto , 1000cc	12 "
(79)	Pipet washer	1 set
(80)	Centrifuge tubes, 15cc	600 pcs
(81)	Ditto , 50cc	120 "
(82)	Staining rack	10 "
(83)	Beaker, 100cc	10 "
(84)	Beaker, 200cc	10 "
(85)	Erlenmeyer flask with stopper, 50cc	20 "
(86)	Ditto , 100cc	20 "
(87)	Ditto , 300cc	20 "

N) Immunology Department

1. High speed refrigerated centrifuge, max. 18,000 r.p.m. 29,700 x G, complete with angle rotor and spare parts. 1

2. Deep freezer, capacity: approx. 370 liters, temperature: -40°C, equipped with thermometer, thermo regulator and sub-lid 1

3. Ultra-low temperature freezer, all stainless steel, chest type, capacity 100 liters, temperature: -85°C, equipped with thermometer, temperature indicator, alarm system, timer, sub-lid, and casters. 1

4. Refrigerator, capacity: approx. 310 liters 1

5. Research binocular microscope, "OLYMPUS" Model BHS-113 standard set or equivalent, with 2 spare lamps. 1

6. Low temperature incubator, temperature range 0 to 50°C, stainless steel chamber, inner size: 40 W x 40 D x 40 H cm 1

7. Incubator, stainless steel chamber, max. temperature 50°C, 3 shelves, inner size: 40 W x 40 D x 45 H cm, complete with automatic thermoregulator and stand. 1

8. Water bath with thermo regulator, stainless steel, inner size: 50 W x 29 D x 16 H cm 1

9. pH meter, digital display, range: pH 0.00 - pH 14.00, 0 - 1,999 mV, 0 - 50°C, complete with accessories. Spare parts & consumable: 2 electrode, 5 buffer solution pH 4.01 (500 ml), 5 buffer solution pH 6.86 (500 ml) 5 KCl solution (100 ml) 1

10. Table top centrifuge, automatic control system, 3,500 r.p.m., 15 ml x 40 pcs, 30 min. automatic reset timer, complete with 1 swing rotor, 4 metallic case for 50 ml tube, 4 resin case for eight 15 ml tubes. 1

11. Precision balance, top loading, capacity: 200 g scale interval: 1 mg, digital display, 240 V 50 Hz 1

12.	DNA test kit, FD304	10
13	TPHA test kit, FD106	10

O) Blood Bank Department

1.	Blood bank refrigerator, for blood bags, all stainless steel, temperature 4°C, capacity 700 liters, 5 shelves, equipped with a temperature recorder, alarm system and sub-lid, with consumable for one year	1
2.	Incubator, stainless steel chamber, max. temperature 50°C, 3 shelves, inner size: 40 W x 40 D x 45 H cm, complete with automatic thermoregulator and stand.	1
3.	Research binccular microscope, "OLYMPUS" Model BHS-113 standard set or equivalent, with 2 spare lamps.	1
4.	Water bath with thermo regulator, stainless steel, inner size 50 W x 29 D x 16 H cm	1
5.	Hematocrit centrifuge, max. speed 12,000 r.p.m., max. force 14,800 x G, capacity: 20 capillary tubes and 15 ml x 4, complete with hematocrit rotor.	1
6.	Deep freezer, for fresh plasma, chest type, capacity approx. 200 liters, temperature: -25°C, complete with temperature recorder and alarm system. Spare parts: 1 basket and recording paper for one year.	1
7.	CPD blood bag, single 450 ml, "KAWASUMI" Model KBS-450 or equivalent.	2000
8.	CPD blood bag, double, 450 ml, Model KBD-450 or equivalent.	1000
9.	CPD blood bag, triple 450 ml, Model KBT-450 or equivalent.	1000
10.	Blood Donor Instruments Set	1

Contents:

(1)	Syringe for blood donor, 10 cc	1000 pcs
(2)	Pasteur pipet, 9"	2000 "
(3)	Test tube, 30ϕ x 200 mm	50 "

(4)	Test tube rack, 30ϕ x 10 pcs	3 pcs
(5)	Komagome pipet, 2 cc	30 "
(6)	Ditto, 5 cc	30 "
(7)	Venous congestion belt	3 "
(8)	Adhesive plaster	10 "

P) Consumable Items

1. Consumable, different types and sizes 1

Contents:

(1)	Foley balloon catheter	1000
(2)	Nelaton catheter	1000
(3)	Pezzer mushroom tip catheter	500
(4)	Stomach catheter	1000
(5)	Levin duodenal tube	500
(6)	Rectal catheter	500
(7)	Suction catheter	2000
(8)	Endotracheal tube, P.V.C.	1000
(9)	Tracheostomy tube, P.V.C.	200
(10)	T tube	500
(11)	Silicon rubber tube	400 m
(12)	Latex rubber tube	400 m
(13)	Surgeons' glove	3000 pairs
(14)	Drainage tube	400 m
(15)	I.V. catheter set	2000
(16)	P.T.C.D. set	100
(17)	C.V.P. catheter set	200
(18)	Biopsy needle	300
(19)	Feeding tube for infant	2000
(20)	Exchange transfusion set for newborn baby	200
(21)	Blood administration set	1000
(22)	Solution infusion set	1000
(23)	Disposable syringe with needle	3000
(24)	Suture needle with suture	2000
(25)	Absorbent cotton, 500 g	300
(26)	Oxygen face mask, vinyl	500
(27)	3-way cock	500
(28)	Air way, polyethylen	100