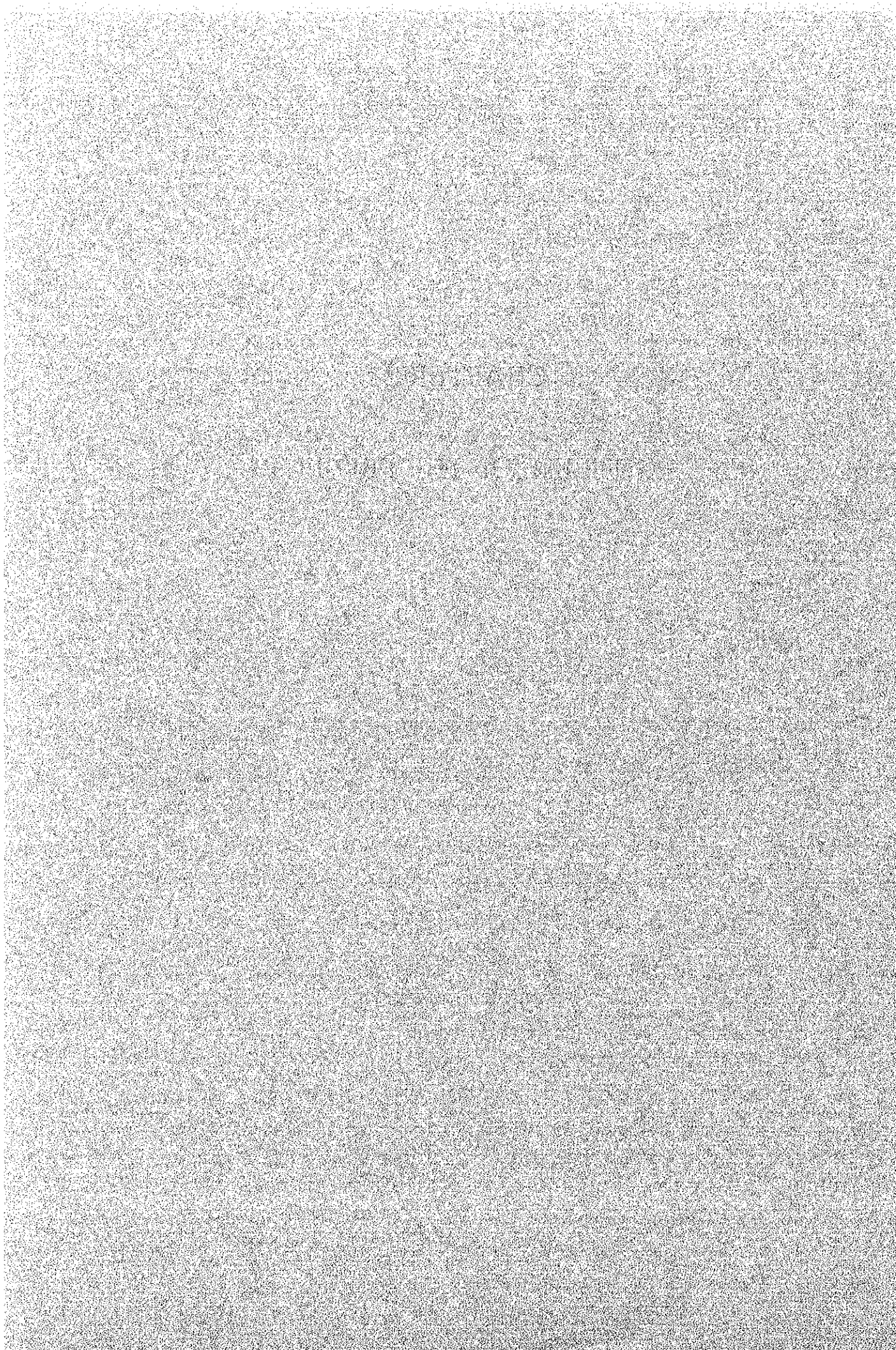


## **CHAPTER 2**

### **OUTLINE OF THE PROJECT**

## CHAPTER 2

### OUTLINE OF THE PROJECT



## CHAPTER 2      OUTLINE OF THE PROJECT

### 2-1      Objectives of the Project

The objectives of the study is to design a basic plan for the proposed project to specify the scope of works and the specification of equipment with the examination of the feasibility of the project and its appropriate scope of works, and the design of appropriate programmes which would optimize benefits to be borne by the project for the people living around the project site. For this the aid policy of Japan should be taken into consideration so that the project would contribute to improve the most demanded medical services for the project hospital.

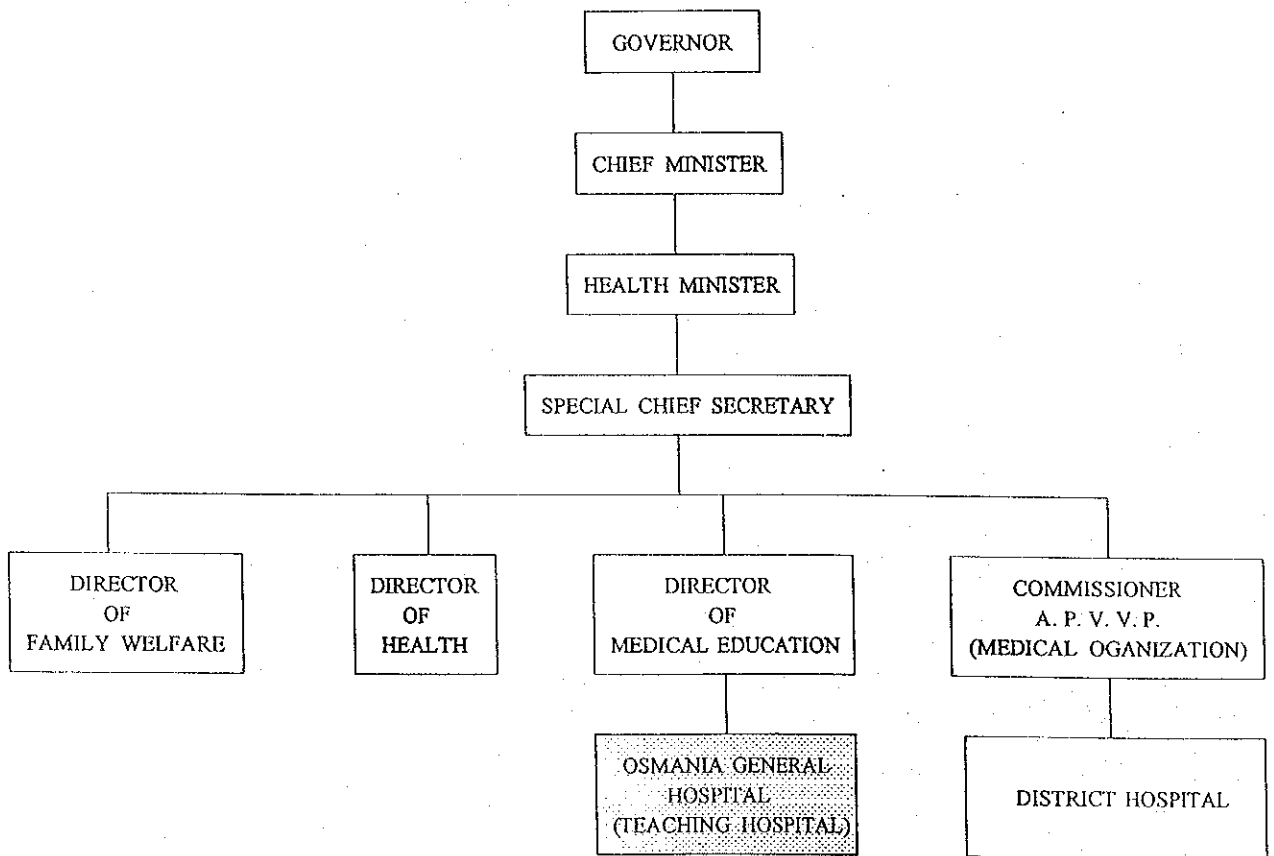
2-2 Project Description

2-2-1 Executing Agency and Operational Structure

Executing Agency and their operational structure are shown as the following charts.

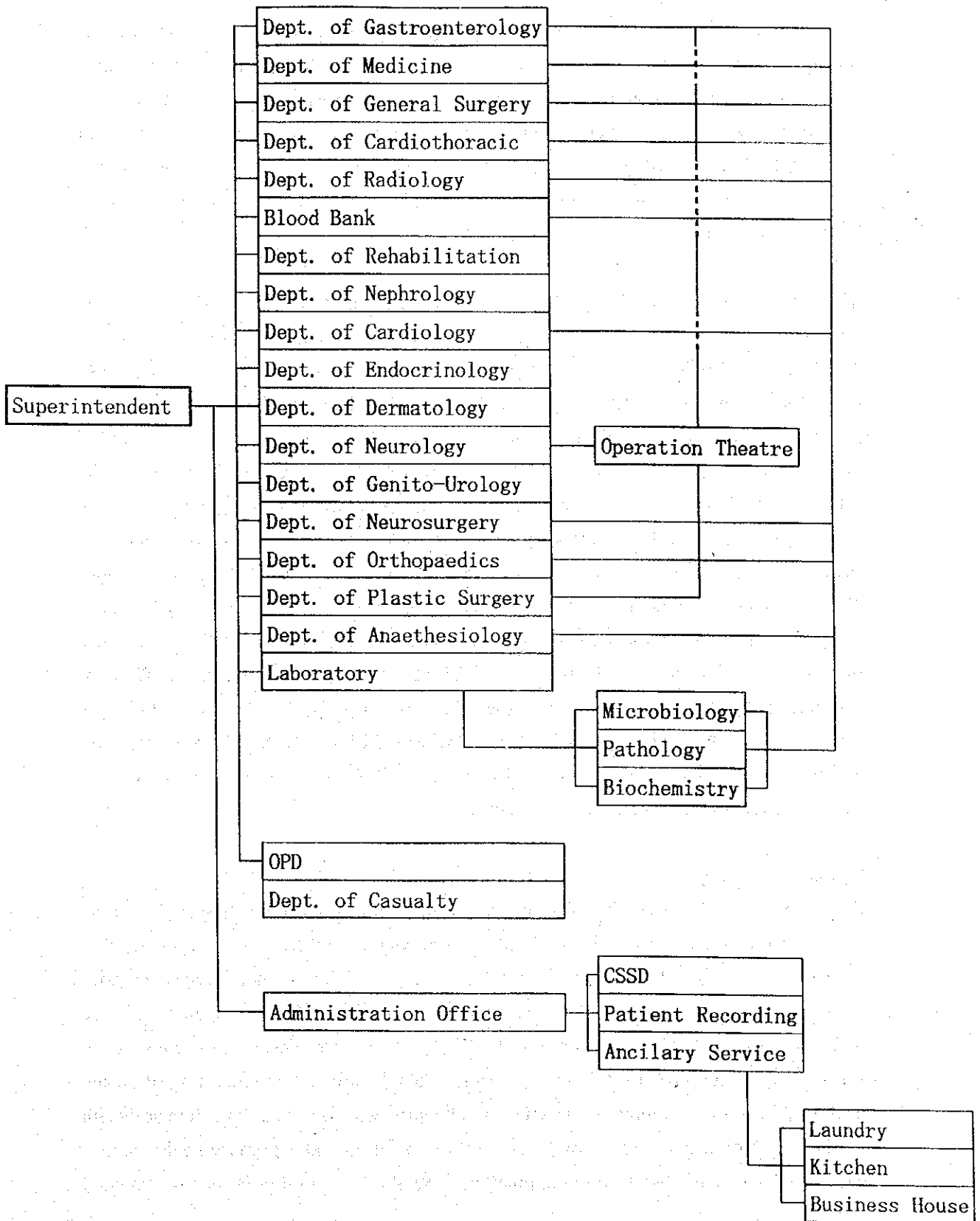
Organization Chart of Andhra Pradesh State Government

Organization Chart of Andhra Pradesh State Government



Execution Agency and Operation Structure

Organization Chart of OSMANIA GENERAL HOSPITAL





## 2-2-2 Financial Status of the Sector

In view of the resource constraints, there is need for raising resources to maintain the quality of care and meet rising expectations of the people. It is towards human development that health and population control are listed as two of the above six priority objectives of this Plan. Health facilities must reach the entire population by the end of the Eighth Plan. Along with the emphasis on consolidation of primary health care, the strengthening of secondary care services and optimization of tertiary care services would be the key objectives of the Eighth Plan.

The increase in the availability of health care institutions in the state is by all counts impressive. In the public sector, there is a multi tier structure: 10,568 Sub Centers: 1,306 Primary Health Centers: 174 Community Health Centers: 119 dispensaries: 139 hospitals at taluk level: 117 district hospitals: 46 medical mobile units: 38 tertiary hospitals attached to 9 medical colleges and 2 super specialty hospitals. In addition there are also 23 District TB Centers, 25 TB clinics and 194 leprosy control units. The ratio of population served by a health care institute offering general services has decreased from 1:63,000 in 1956 to 1:39,216 in 1990. In terms of beds the number in the public sector have increased from 13,995 in 1956 to 27,899 during the same period. The total number of doctors working in the public sector are estimated to be 6,412 bringing the ratios of population to doctors down from 1:30,000 to 1:10,330. Similarly, there are an estimated 15,514 nurses and 17,120 para medics working in the different institutions. In addition to the above, there are also health care facilities provided by other departments, such as the Ministry of Railways, Mines, Labor, Police, Irrigation and public and private sector industrial units who all in turn run health care facilities employing doctors, nurses and support staff.

### Status of the Sector

As per the Directive Principles of the Constitution, health care is the responsibility of the state government, to be provided without discrimination and free of cost. However, the Central Government through the mechanism of providing financial assistance does influence investment decisions by the states. Accordingly, in consonance with the national policy, allocations from the 6th Five Year Plan Period (1980-85) were substantially increased for establishing a primary health care system consisting of village health guides in the community (VHG), a subcentre with one male and female health worker, each of which covers for every 5,000 population and a primary health center, each of which covers for 100,000 population. While the central government provided

funding support for the training and monthly honoraria of the VHG, accommodation, drugs, equipment and the appointment of the female health worker in the subcentres, the state government had to provide for the male worker in the subcentre, the medical officer and support staff and infrastructure in the primary health centre. Since this policy was essentially motivated with a view to provide basic health care services to the rural populations, all vertical programmes were replaced with integrated services. Thus, except for leprosy, other public health programmes such as malaria and TB are implemented through the PHC's and the subcentres along with family planning and family welfare programmes. Later in 1988, government of India sought to decentralize the structure further by providing a PHC with 6 beds for every 30,000 population and upgrade the old PHC into a Community Health Centre to consist of a minimum of 30 beds and four specialist doctors to attend to pediatric care, gynecology, surgery and general medicine. The funding support for the PHC's and the CHC's is provided to the state under the Minimum Needs Programme of the central government. Thus, as can be seen, most of the national health programmes, control of malaria, TB, blindness, family planning, mother and child health are implemented through this structure. Community outreach for other programmes such as goitre control, STD, AIDS, guineaworm etc. is also through the PHC system of which the CHC is an integral component.

During the 7th Five Year Plan (1985/86 to 1989/90), a total amount of Rs.18.4 billion was spend on health (medical, public health and family welfare) - Rs.18,024 million on revenue account and Rs.473 million on capital account. During the current year 1992/93, an amount of Rs.5,890 is provided for on revenue and Rs.12.4 million on capital account.

Of the total amount spent on Health and Family Welfare, the amount spent during the 7th Plan period and provided for the current year (revenue account) on hospitals at the tertiary, district and primary care level was as follows:



Type of Hospital	7th Plan	1992/93 (Rs. in millions)
a. Tertiary	2,248	654
b. District	228	14
c. CHC (under DHS)	664	129
d. APVVP Institutions other than District	915	399
e. Special TB centres	72	24
f. Others	38	3
<b>TOTAL</b>	<b>4,165</b>	<b>1,223</b>
% to total on Health	23%	20%

The above table does not include assistance to private hospitals, city and district/taluk level dispensaries and the PHC as they largely provide ambulatory services.

The main constraint on considering the option of raising resources by charging of fees is that in the existing political system health care is to be provided free of cost of all people. Therefore while the government has provided for about Rs.18 per capita on hospital services during the current year, an analysis of the household expenditure pattern shows that on an average, the per visit expenditure incurred by a person seeking medical care in a government facility is Rs.328 in the rural areas and Rs.433 in the urban areas as against Rs.873 and Rs.1,018 incurred in the private hospital. These costs were for medical tests, drugs and supplies such as IV fluid, blood etc. and not available at the facility for want of adequate budget. These expenditures do not include transaction costs nor those incurred on travel. Added to that should also be wages lost of the patient and expenses incurred on diet, travel and lost wages of the attendant. Added, the costs incurred by the poor who are the main users of government facilities are very substantial and explain to a large extent the low utilization of institutional care, which for example, in the case of child birth continues to be 13.5%. The data is comparable even in those cases where the patients are availing "free" service as against pay in wards available in the government institutions. This analysis thus, makes it clear that underfunding results in not only low quality care but also heavy costs to the poor who do not even get their money's worth. It is, thus, proposed to initiate, carefully, the concept of charging fees and evolving over time, a balanced policy which will contain the costs while at the same time enable supply of free, subsidized care to the really indigent and affordable care in accordance with their purchasing power, to the rest.

Osmania General Hospital, the project hospital of this project, functions as a medical institute for tertiary health care services of Andhra Pradesh, to provide medical services to the communities covered under its umbrella, which covers the hospitals of secondary health care system.

The standards of secondary hospitals managed by APVVP of Andhra Pradesh are described below.

#### Community Hospital

Number of bed: more than 30

Facility: X-ray (1), Ultrasound, E.C.G., Dental unit, etc.

Medical Staff: Doctor (1), Assistant doctor (1), Medical officer (1)

#### Area Hospital

Number of bed: more than 100

Facility: X-ray (3), Ultrasound, E.C.G. (2), Operating Theatre, Blood Bank, Dental unit, etc.

Medical Staff: Specialist doctor (1 to 3), Doctor, Assistant doctor

#### District Hospital

Number of bed: from 150 to 250

Facility: X-ray (5), Ultrasound, E.C.G. (3), Operating Theatre (8: including Ophthalmology and ENT), Blood Bank, Dental unit, Heart monitor, etc.

Medical Staff: Specialist doctor (1 to 3), Doctor, Assistant doctor

There are some private hospitals which substantially provide advanced medical services. However the fact that they are not so easy to access for poor people who occupy the 80% of all population may legitimize the necessity of improving public hospitals. Under this circumstance, it is not difficult to expect that the poor condition of the existing facilities of the project hospital would preclude it from optimizing its expected functions as a top

referral hospital. In order to cope with this demand to fill the gap, the hospital has made a project to construct a diagnostic centre and to improve medical equipment for the centre so that the medical services of the hospital would be strengthened as a whole.

### 2-2-3 Outline of Osmania General Hospital

In the year 1866, the new double story building named as Afzalgunj Hospital was constructed exactly in the same place of present Osmania General Hospital. Main double story structure of Afzalgunj hospital was irreparably damaged by a devastating flood of the river Musi in the year 1908. The annex to main building survived and these single story structure's functioned as Afzalgunj Hospital.

Nawab Mir Osman Ali Khan VII King of Asafjahi dynasty decided to construct a new grand hospital after demolishing the damaged double story structure. But the project was temporarily shelved on account of first world-war. The construction of the present magnificent structure of Osmania General Hospital was taken up after the end of world-war in 1920 and completed in 1925. Afzalgunj hospital was shifted into this new building and the vacated building was converted into Osmania Medical College. The original building of Osmania Medical College existed just behind the Ravindra Bharathi in Khairatabad. The foundation of present magnificent building of Osmania Medical College in the premises of old British residency, was laid in 1956 by the chief-minister Dr. B.Ramkrishna Rao and the building was inaugurated in 1962 by the president of India Dr. S.Radharishnan.

The Osmania General Hospital is located over an area of 26.75 acres. The present hospital consists of two different blocks one for mainly outpatient and emergency services which is otherwise also called as Golden Jubilee Block as is constructed on the occasion of Golden Jubilee of this hospital. The old building mostly gives inpatient, investigations and other services.

This institution is the main undergraduate and postgraduate hospital and the specialty hospital and attached to Osmania Medical College. This is the biggest and oldest teaching hospital in the State. The total sanctioned bed strength is 1,168 and the actual bed strength is 1,280. The average is around 90%.

Almost all the basic specialties and all the super specialties are available in this Hospital. Since there are special hospitals for Ophthalmology, ENT Specialty, Psychiatry, Tuberculosis, Ob-Gynecology, Paediatrics in the city, there are only outpatient facilities for their specialties.

All the patients who undergo investigations and treatment are treated completely free. Only the patients admitted in paying rooms are charged nominally.

In collaboration with the Quli Qutub Shah Urban Development Authority and Osmania General Hospital Centeray Celebration Committee is bringing up an ultra modern diagnostic centre near the Golden Jubilee Block of Osmania General Hospital which will provide the modern diagnostic facility for the patient and also emergency treatment facilities. The building is partly functioning as Quli Qutubshah Diagnostic Centre.

The compound of 27 acre (109,000 m<sup>2</sup> approximately) contains main ward, outpatient ward, new building, nurse school, dormitory for nurses, dormitory for staff, laundry building, and dormitory for workers.

The mission studied main ward, outpatient ward, laundry building, and new building among others. The results on the facilities are outlined below.

#### Main Ward

This ward is made of RC and three stories high with approximately 20,500 m<sup>2</sup> of the total floor area. It is 70 years old and generally superannuated. That the piping of water supply and wiring of electricity are exposed outside the building indicates that it has been repaired several times. Generally the facilities are not in good condition.

On the ground floor of the building there are department of radiology, CSSD, ICU for heart disease, rooms for dialysis, blood bank, rooms for endoscopy, department of digestive organs, medical record room, and clinics of other departments. Despite a shortage of beds, there are 80 beds for VIP (private room, categorized in two classes). On the first floor, there are main operating theatres, bio-chemical laboratory, clinical-pathological laboratory, bacteria laboratory, and sickrooms. The second floor is occupied with Operating theatres and sickrooms.

Outpatient department, which receives about 3000 patients per day, is located in a different building, including emergency section and acute medical care. In the building there are four rooms of operating theatre, X-ray room, pharmacy, plaster bandage room, general laboratory, rooms for a duty doctor and nurse, sickroom, 24-hour observatory room. In terms of administration, this building is an independent hospital mainly for emergency surgery and internal medicine. In addition, there is a dental school on the second floor. Other relevant facilities are a nursing school and its dormitory situated inside the compound.

### Conditions of electric supply

There are two separate wiring from the outside in case of brown-out. The supply of 440V, 3P is transformed down to 230V at a substation. There is no electric generator for emergency.

### Conditions of water supply

Water is supplied both from public services and the wells of the hospital while the water from the wells is used only for laundry and cleaning. The result of examination of the water by a nephrologist of the hospital (in charge of dialysis) does not indicate any problems nor conditions for any special pre-treatment. Since the used water can be drained through the main drainpipe of the city, no septic tank is installed.

### New Building

This two-year-old building is made of RC and three stories high with about 30,000 m<sup>2</sup> of the total floor area. There is a plan of extension to make it six stories high in future. The construction has already completed its first phase but is suspended at the second phase for the detailed plan of the equipment to be installed is not finalized. Only the first floor, where an angiography is installed, starts its services of diagnosis and treatment. On the ground floor there are administration office, department of radiology, and laboratories for microbiology, bio-chemistry, and clinical pathology. The first floor has two operating theatres, X-ray Cath-Lab, recovery room, blood bank, sterilizing room, and sickrooms. The second floor is for two operating theatre, special sickrooms, ICU, and sickrooms.

### Conditions of electrical supply

As well as the main ward, there are two different wiring with 230V down-transformed from 440V, 3P at the substation. There is an emergency generator to be used for construction works. Every room has been already equipped with a distribution room and outlets with a perspective that some equipment would be installed in future.

### Water supply and drainage

Water is supplied both from the Hyderabad city public service and the wells of the hospital. While the water supplied from the wells is used only for cleaning, the drainage is directly connected to the main ward and thus there are no septic tanks.

### Voltage test

An examination was made to check voltage fluctuation rate with AC monitor. Even though the data submitted by the hospital record is Max 230V +/- 10V, our examination result shows Maximum 226.9V, Minimum 220.1V and 223.3V in average (measured every hour from 10 a.m. to 5 p.m.). Necessity of Automatic Voltage Regulator (AVR) for some sophisticated equipment is advisable, because AVR performing only narrow voltage fluctuation. Electric loadshading occurs (a few times everyday), it takes about 10 minutes to switch another supply of electricity.

### Sampling of water

Water sampling is collected from the public service as well as the wells. The examination result in Japan shows water quality is similar to that of Tokyo even though a few particles of iron rust are found in the water. Therefore filter-treatment is advised for some sensitive laboratory equipment, but not necessary for ordinary distilled purification apparatus system.

Osmania General Hospital consists of diverse specialty departments, namely of medicine, outpatient, surgery, radiology, blood bank, physio-occupational therapy, nephrology, cardiology, endocrinology, dermatology, neurology, urology, neurosurgery, orthopaedics, plastic surgery. Brief descriptions of each department are given below.

### Department of Medicine

This Department is functioning since the inception of the Osmania General Hospital. There are six units, each of which is headed by one Professor and two Assistant Professors while the head of the department has 3 Assistant Professor and one Research Assistant. The present number in the department totals 6 of Professors and 14 if Assistant Professors. Each unit has 54 beds (either for male or female).

The head of the Department also supervises Acute Medical Care Ward, which has established in 1970, with assistance by two qualified Senior Medical Officers.

### Outpatient Block

This departmental block contains 16 components: Casualty (8 casualty medical officers, 5 surgical assistants, 4 medical assistants, 2 orthopaedic assistants, 2 anaesthesia assistants, 10 postgraduates and 20 internees), Minor Operation Theatre, Emergency Operation Theatre (4 operation theatres), Acute Surgical Care (20 beds for intensive management of immediate care before and after the major operation), Surgical Emergency-cum-Observation (25 beds for males and 25 beds for female patients, who

are neither actually ill nor fit to be discharged, are kept here under observation), Acute Medical Care (2 medical doctors, 6 postgraduates, and 2 house surgeons. There are 25 beds), Medical Emergency-cum-Observation (17 beds. Here the patients, who are suspected to have some difficulty are kept under observation for a maximum period of 24 hours), Outpatient Clinic, Injection Room, Medical Dispensary, Physio-Therapy (2 physiotherapists and 2 occupational therapists), Emergency Laboratory (2 Gazetted Assistants, 7 Laboratory Technicians, and 2 Laboratory Attendants), Microbiology Laboratory (1 Professor, 3 Assistant Professor), Outpatient Pathology Laboratory (1 Senior Laboratory Technician, 3 Laboratory Technician, and 3 Laboratory Attendants), E.C.G. (7 qualified technicians), X-ray (3 Radiologists, 4 Radiographers, and 3 Dark Room Assistants).

#### Department of Surgery

This department is one of the earliest departments of Osmania General Hospital, which was upgraded in 1968. Each surgical ward has got a clinical laboratory, manned by a qualified Laboratory Technician. The department consists of six units headed by a professor for each with 16 Assistant Professors and 1 Research Assistant for all.

#### Department of Radiodiagnosis

There are 1 Professor of Radiodiagnosis, 6 Assistant Professor, 1 Research Assistant, 1 Assistant Radiologist, 11 Radiographers.

#### Blood Bank

There are 2 Medical Officer, 2 Nurses, 4 Technicians.

#### Physio-Occupational Therapy Department (Rehabilitation Unit)

The Department has three wings; 1) Therapeutic Exercise Wing where the patients receive remedial/therapeutic/complemental exercises, 2) Electrotherapy Wing where the patients receive short wave diathermy, infra red therapy, wax bath therapy etc., and 3) Counseling-cum-Prevocational Testing/Training-cum-Rehabilitation Wing.

#### Department of Nephrology

There are 2 Professors, 2 Assistant Professors, and 6 Tutors.

#### Department of Cardiology

There are 2 Professors, 5 Assistant Professors, and 3 Tutors.



Department of Endocrinology

There are 1 Professor, 2 Assistant Professors, 1 Bio-Chemist, 1 Technician, and 1 Laboratory Attendant.

Department of Dermatology

There are 2 Professors and 4 Assistant Professors.

Department of Neurology

The Department consists of 2 units headed by 2 Professors and assisted by 4 Assistant Professors.

Department of Urology

The Department is headed by 1 Professor and assisted by 5 Assistant Professors.

Department of Neurosurgery

The Department consists of 2 units headed by 2 Professors and assisted by 3 Assistant Professors and 2 Tutors.

Department of Orthopaedics

The Department consists of 3 units headed by 3 Professors and assisted by 11 Assistant Professors. There are 120 beds.

Department of Plasticsurgery

There are 2 Professors, 3 Assistant Professors, and 1 Tutor.

Activities: from the statistics of 1992.

<b>Department</b>	<b>Outpatient</b>	<b>Inpatient</b>	<b>Major Op.</b>	<b>Minor Op.</b>
Orthopaedics	48,765	4,870	1,675	629
Surgery	22,008	10,017	2,272	7,131
Cardiology	700	308	160	-
Neurosurgery	11,000	3,038	530	161
Nephrosurgery	9,906	949	591	1,316
Plastic Surgery	4,820	548	524	348
Ambustion	728	1,039	528	-
General Medicine	133,920	14,987	-	-
Digestive Medicine	12,880	897	-	-
Circulatory Medicine	7,300	1,740	-	-

Neurology	11,265	275	-	-
Nephrology	1,205	642	-	-
Endocrinology	4,375	150	-	-
Dermatology	26,327	-	-	-
Anesthesiology	-	-	7,758	-

\* The majority is outpatient, particularly of emergency case. In total the hospital receives about 300,000 to 400,000 outpatients annually.

\* Emergent outpatient, different from general outpatient, has

Osmania General Hospital is designated as the educational hospital for clinics and training of postgraduates of Osmania Medical College at Hyderabad. It is also the top referral hospital of health care supply system of Andhra Pradesh region, playing the most important role in terms of training services among 8 educational hospitals attached to medical schools in Andhra Pradesh.

Number of staff

1. Professor	36
2. Assistant Professor	135
3. Senior Government Officer	9
4. Head of nurse	57
5. Nurse	267
6. Technician	177
7. 4th-Grade Staff	776
8. Middle-Class Government Officer	68

Student Nurse and Doctor

1. Student Nurse	220
2. Student Doctor	216
3. Graduate Doctor	162
4. Senior Graduate Doctor	14

**Number of Staff at Each Department**

Dept.	Prof.	Assist. Prof.	Head of Nurse	Nurse	Typist	4th-Grade Staff
Circulatory Medicine	2	7	1	6	1	5
Chest Surgery	2	2	2			1
Neurology	2	3	2	1		4
Neurosurgery	2	4	2			3
Blood Bank		2	1	8		4
Microbiology	2	3		8		2
Pathology	2	12		8		3
Bio-Chemics	2	5		17		4
Radiology	1	6		9		2
Endocrinology	1	2		3	1	2
Digestive organ	1	4	1	1	1	4
Surgery	6	18	5	1	2	4
Internal Medicine	6	18	5		2	4
Orthopaedics	3	9	3		2	4
Urinology	2	6	2	4		4
Plastic Surgery	2	8	2	4		4

**Budget**

**Expenditures of Administrative Cost of Osmania General Hospital**

Items	1991-92	%	1992-93	%	1993-94	%
Salary	423.21	62.00	447.04	65.31	641.60	41.30
Consumable	143.20	20.98	120.20	17.56	150.93	9.72
Foods	17.00	2.49	15.00	2.19	16.00	1.03
Equipment	5.00	0.73	4.00	0.58	546.75	35.19
Water, Electricity	60.00	8.79	60.00	8.77	159.50	10.27
Transportation Allowance	0.35	0.05	0.35	0.05	0.35	0.02

(Budget Allotment for the Year 1992-93, 1993-94)

Training Cost	1991-92	1992-93	1993-94
Salary	3.75	5.47	5.47
Salary	0.06	0.06	0.10
Training Cost	1.90	2.00	2.00

#### 2-2-4 Condition of Other Hospitals in the Region

Osmania General Hospital takes the role of a top-referral medical facility in the State. In order to understand Osmania General Hospital's role and function with the other equivalent institutions in Hyderabad, we surveyed the following institutions and conducted the investigations.

##### Nizam's Institute of Medical Sciences - Panjagutta

This is one of top-level public medical institutions in India having autonomous management. In putting a special stress on respiratory diseases and neuro-surgical diseases, most of the doctors and senior staffs have been educated and trained in those advanced countries as U.S.A. and the Britain. With high technical levels they engage eagerly in the clinical studies desiring to be in the summit of the medical science in the world. The clients of the Institute are mainly the patients who can afford to pay the fees and charges. On the other hand, as a public agency this institution is required to treat the cases which are not taken care of by private hospitals and in many cases are not profitable. For instance, X-ray CT diagnoses of stomach, which are trouble and time-consuming, are dealt here overwhelmingly more than in the private sector hospitals; head 60 %, abdomen 40% in Nizam against head 80%, abdomen 20% in the private sector.

The gist of the institution is as follows:

Number of Bed : 525 beds

Department: General Surgery, Cardiothoracic, Neurosurgery, Orthopaedic, Plastic Surgery, Genito-Urology, Medicine, Gastroenterology, Cardiology, Neurology, Nephrology, Immunology, Oncology, Radiology, Nuclear Medicine and Pathology

Number of Staff: Doctors 230 (doctors and senior staffs: 116, Residents:114)

Facility: CT scanner, MRI, Gamma Camera, Color Doppler, Holter ECG, EEG, Evoked EEG, EMG, Dialyzer (8 units) etc.

Clinical Activities: Out-patients: 177,684 per year,  
In-patients: 17,808 per year,  
Surgical cases: 6,469 per year.

Dept. of Cardiology can handle coronary angiography, coronary angioplasty by way of balloon dilatation catheter and valve-plasty.

Dept. of Cardiothoracic can handle bypass graft plasty.

CT examinations: 30 cases or so per day, out of which 30 to 40 % come from outside

The fees are approximately; Rs.2,000 (=¥7,000.-) per case for abdomen

Rs.1,400 (=¥4,900.-) per case for head

Non-chargeable patients occupies a quarter.

Nuclear medicine examinations: approx. 15 cases per day.

#### M.N.J. Institute of Oncology- Red Hills

For the purpose of grasping the status and conditions of the maintenance for the medical equipment in India, we conducted the investigation on the status quo of the maintenance for the X-ray CT scanners (manufactured by Hitachi), which have been provided under the Japanese Grant Aid. At the time of installation the equipment and parts/accessories were supplied with one (1) year guarantee from the manufacturers. Accordingly, the Institute made a maintenance contract for the equipment with outside agents 2 years after the installation and initiated the purchase of the parts by its own money (budget) 3 years after the installation. The parts/accessories estimation sheet issued by the manufacturers (bulbs, parts etc.) stated that the quotation as of July, 1993 is 7.6 million in Japanese currency. The maintenance contract with a local agent we saw at the site stated that their services cost Rs.175,000.- (=¥612,500.-) per year for 2nd year to 3rd after delivery and Rs.190,000.- (=¥665,000.-) after 4th year on against the maintenance jobs including once-a-week periodical check but excluding the parts' price. In case of urgency they are available on the day requested.

The annual cost required for the said maintenance contract is estimated to be about Rp.113,137,000 in relation to the entire expenditure for PHC (about 12,167 centres) and relevant health sector as described in the section. This situation should not be overlooked though most of the equipment introduced by this project are for advanced medical services.

The followings are the investigation data on CT scanners utilization (number of annual patients) after the start-up of the grant aid equipment in 1989;

Year 1990:	1,023
1991:	3,250
1992:	3,460
1993:	3,560
1994:	3,250 (up to October) Total: 14,543 patients

The M.N.J. Institute of Oncology plans to charge the diagnosis cost of CT scanners to the patients and is applying for the approval of the plan by the state government agency of Andhra Pradesh in charge.

The planned schedule of CT scan charges to be collected by patients is shown below;

1. C.T. Scan of Head and Brain	Rs.600.-
2. " " of Abdomen	875.-
3. " " of Complete Spine	1,125.-
4. " " of Neck	875.-
5. " " of Spine - 2 Discs	600.-
6. " " of Orbits	600.-
7. " " of Internal Ear	375.-
8. " " of Guided Biopsy	300.-
9. " " of Each Region	875.-
10. " " of Whole Body	2,500.-

## 2-2-5 Operation and Maintenance Plan

Under the present administration system, there are 6 Resident Medical Officers supervised by the superintendent of the hospital to maintain the stock of storage, electricity, facility and workshop, and communication system. There are no Bio-Medical Engineers in the hospital who can handle the maintenance of medical equipment. The maintenance of medical equipment is operated by a visiting technicians of the Government of Andhra Pradesh. On-call visit is available in case of emergent case. However, complicated works of repair and maintenance as well as the supply of consumable should be contacted to the suppliers of the equipment. Regarding the equipment to be supplied in this grant project, additional budget for incremented recurrent maintenance cost as well as manpower would be required for their full utilization. The details are shown in the first table of the next page.



REF. No.	DESCRIPTION	MAINTENANCE COST I (SERVICES) (x1000)			MAINTENANCE COST II (SPARE PARTS)			MAINTENANCE COST III (CONSUMABLES)			(x1000) TOTAL COST			
		UNIT	QTY	AMOUNT	REMARKS	NAME	UNIT	QTY	AMOUNT	NAME		UNIT	QTY	AMOUNT
13	MRI SYSTEM  Base of estimation: Days of operation: 240 days No. of patient: 5/day No. of film: 3/person	500,000	3	1,500	Technical charge only (not including materials and other direct expenses) 3 times per year	Cannot be specified In case of P.M. type (Hitachi)	500,000			Film	700	3,600	2,520	
						In case of SCDM type (Toshiba, Shimazu)	2,000,000			Contrast media	1,750	3,600	6,300	
										Developer	5	3,600	18	
		1st year	not necessary			not necessary				Consumables	to be depreciated			24,000
		2nd year		1,500		not necessary				Consumables	to be depreciated			8,838
		3rd year		1,500						Consumables	to be depreciated			24,000
12	WHOLE BODY CT SCANNER  Base of estimation: Days of operation: 240 days No. of patient: 12/day No. of film: 3/person	500,000	3	1,575	Technical charge only (not including materials and other direct expenses) 3 times per year	for revitalization	500,000			Film	700	8,640	6,048	
						can not be specified (varies depending on cases)	10% up			Contrast media	1,750	8,640	15,120	
										Developer	5	8,640	43	
		1st year	not necessary			Rough estimation for one year	40% up	3,100		for revitalization	-10% up			9,185
		2nd year		1,500										19,000
		3rd year		1,500										40,211
13	5-year Depreciation Estimated Cost for one year	1st year	not necessary			not necessary				Consumables	to be depreciated			21,211
		2nd year		1,500		Spare parts	325			Consumables	to be depreciated			19,000
		3rd year		1,500		Spare parts (including X-ray tube)	7,800			Consumables	to be depreciated			44,157
		4th year		1,650		Spare parts	550			Consumables	to be depreciated			19,000
		5th year		1,650		Spare parts	825			Consumables	to be depreciated			53,965
		6th year		1,815		Spare parts	1,237			Consumables	to be depreciated			19,000
									Consumables	to be depreciated			26,950	
									Consumables	to be depreciated			48,425	
									Consumables	to be depreciated			30,002	

REF. No.	DESCRIPTION	MAINTENANCE COST I (SERVICES) (x1000)		MAINTENANCE COST II (SPARE PARTS)		MAINTENANCE COST III (CONSUMABLES)		UNIT	Q'TY	AMOUNT (x1000)	TOTAL COST (x1000)			
		UNIT	Q'TY	AMOUNT (x1000)	UNIT	Q'TY	AMOUNT (x1000)					UNIT	Q'TY	AMOUNT (x1000)
8	CATHLAB EQPT FOR PTCA  Base of estimation: Days of operation: 260 days No. of patient: 5/day No. of film: 5/person	500,000	3	1,500	Technical charge only (not including materials and other direct expenses) 3 times per year	II tube	2,000,000	1	2,000	Film	700	2,500	1,750	
						X-ray tube	800,000	1	800	Roll film	30,000	36	1,080	
						Others	700,000	1	700	Developer (for roll film)	5	2,500	13	
										Developer	1,000	36	36	
										Contrast media	1,750	2,500	4,375	
										Catheter	5,000	2,500	12,500	
								Injector	1,800	2,500	4,500			
5	I.A.B.P. (DATASCOPE)  Base of estimation: Annual rate of operation Major/Minor 10 cases	10-year Depreciation				not necessary				Consumables	to be depreciated		14,000	
		Estimated Cost for one year	1st year	not necessary						Consumables	24,254		38,254	
			2nd year		1,500						Consumables	to be depreciated		14,000
			3rd year			1,500					Consumables	to be depreciated		39,754
			4th year				10% up				Consumables	to be depreciated		14,000
			5th year								Consumables	to be depreciated		42,880
			6th year								Consumables	to be depreciated		14,000
											Consumables	to be depreciated		45,755
											Consumables	to be depreciated		14,000
											Consumables	to be depreciated		42,955
											Consumables	to be depreciated		14,000
											Consumables	to be depreciated		45,913
5	I.A.B.P. (DATASCOPE)  Base of estimation: Annual rate of operation Major/Minor 10 cases	500,000	3	1,500	Technical charge only (not including materials and other direct expenses) 3 times per year	X-ray tube and II tube can not be specified	1,900,000	10	19,000	Balloon catheter (large)	1,900,000	10	19,000	
										Balloon catheter (small)	1,900,000	10	19,000	
											Consumables	to be depreciated		3,600
											Consumables	to be depreciated		43,100
											Consumables	to be depreciated		3,600
											Consumables	to be depreciated		43,100
5	I.A.B.P. (DATASCOPE)  Base of estimation: Annual rate of operation Major/Minor 10 cases	500,000	3	1,500	Technical charge only (not including materials and other direct expenses) 3 times per year	Battery Pack							3,600	
													43,100	
													3,600	
													43,100	
													3,600	
													43,350	
5	I.A.B.P. (DATASCOPE)  Base of estimation: Annual rate of operation Major/Minor 10 cases	500,000	3	1,500	Technical charge only (not including materials and other direct expenses) 3 times per year	Cables and others							3,600	
													43,350	
													3,600	
													43,350	
													3,600	
													43,350	

REF. No.	DESCRIPTION	MAINTENANCE COST I (SERVICES) (x1000)		MAINTENANCE COST II (SPARE PARTS) (x1000)		MAINTENANCE COST III (CONSUMABLES) (x1000)		TOTAL COST (x1000)					
		UNIT	QTY	AMOUNT	REMARKS	UNIT	QTY		AMOUNT	UNIT	QTY	AMOUNT	TOTAL COST
20	1000M.A. X-RAY UNIT FOR RADIOGRAPHY AND RADIOVAGS	700,000	2	1,400	Technical charge only (not including materials and other direct expenses) 2 times per year	900,000	1	500	Film (Radiography)	300	7,200	2,160	
	Base of estimation: 240 days					2,000,000	2	4,000	Developer	5	7,200	36	
	No. of patient: 10/day (general)					3,500,000	2	7,000	Film (Fluoroscopy)	300	9,600	2,880	
	No. of patient: 5/day (gastroenterology)								Developer	5	9,600	48	
	No. of film: 3/person (general)								Barium	500	1,200	600	
	No. of film: 8/person (gastroenterology)												
	10-year Depreciation												
	Estimated Cost for one year	1st year	not necessary						Consumables		to be depreciated		8,000
		2nd year		1,400					Consumables		to be depreciated	5,724	13,724
		3rd year		1,400					Consumables		to be depreciated	5,688	8,000
		4th year	10% up	1,540					Consumables		to be depreciated	6,257	15,088
		5th year		1,540					Consumables		to be depreciated	6,257	16,847
		6th year	15% up	1,770					Consumables		to be depreciated	7,200	8,000
				1,200					Consumables		to be depreciated	7,200	17,930
				300,000					Consumables		to be depreciated	8,000	8,000
									Consumables		to be depreciated	8,000	18,730
									Consumables		to be depreciated	8,000	8,000
									Consumables		to be depreciated	8,800	19,760
1,4,9	PATIENT MONITORING SYSTEM (Cardiac Monitoring for ICU) (Arterial/Vein Pressure) (Cathlab Monitor)								Consumables				
	No. of patients: 50% average								Mfg's standard consumables (recording papers and others)	2,300,000	1	2,300	
	10-year Depreciation												
	Estimated Cost for one year	1st year	not necessary						Consumables		to be depreciated		1,800
		2nd year		300					Consumables		to be depreciated	2,300	4,100
		3rd year		1,200					Consumables		to be depreciated	1,800	1,800
		4th year	10% up	600					Consumables		to be depreciated	2,300	4,600
		5th year		1,200					Consumables		to be depreciated	2,300	1,800
		6th year	15% up	1,380					Consumables		to be depreciated	2,783	5,383
				300,000					Consumables		to be depreciated	3,060	1,800
									Consumables		to be depreciated	3,367	1,800
									Consumables		to be depreciated	3,367	6,167

REF. No.	DESCRIPTION	MAINTENANCE COST I (SERVICES) (x1000)		REMARKS	MAINTENANCE COST II (SPARE PARTS)		MAINTENANCE COST III (CONSUMABLES)		(x1000) TOTAL COST
		UNIT	Q'TY AMOUNT		NAME	UNIT	Q'TY AMOUNT	NAME	
2	HOLTER ECG SYSTEM  No. of patients: 50	400,000	2	800 Technical charge only (not including materials and other direct expenses) 4 times per year	cannot specify, but a real-time recorder would be needed	900,000	2	1,800 Mfg's standard consumables (recording papers, local calbe, and others)	460
	5-year Depreciation Estimated Cost for one year	1st year	not necessary					Consumables	to be depreciated 1,700
		2nd year		800				Consumables	460 to be depreciated 1,700
		3rd year		800			900	Consumables	460 to be depreciated 1,700
		4th year		400			900	Consumables	920 to be depreciated 1,700
		5th year						Consumables	1,380 to be depreciated 1,700
		6th year		800				Consumables	1,380 to be depreciated 1,700
16	BLOOD GAS ANALYZER  Base of estimation: Days of operation: 312 days No. of patient: 10/day	700,000	2	1,400 Technical charge only (not including materials and other direct expenses) 2 times per year	Electrode set (4 kinds assorted)	290,000	1	290 Mfg's standard consumables (Buffer solution and others)	1,840
	6-year Depreciation Estimated Cost for one year	1st year	not necessary		not necessary			Consumables	to be depreciated 1,580
		2nd year		1,400			290	Consumables	900 to be depreciated 1,580
		3rd year		1,400			290	Consumables	900 to be depreciated 1,580
		4th year		1,400			290	Consumables	900 to be depreciated 1,580
		5th year		1,400			290	Consumables	900 to be depreciated 1,580
		6th year		1,400			290	Consumables	900 to be depreciated 1,580



Material cost estimation for hospital services shown in the 2nd table is calculated based on the direct cost incurred for major equipment. The bases of estimation are as follows.

- 1) The hospital currently subcontracts for the services of repair, preventive maintenance, and procurement of spare parts and consumable of the medical equipment.
- 2) The number of patients, which is one of the basic figures for the estimation is an extrapolation from the medical performance of each department. The days of operation is the actual number of days when the hospital is open. As for the emergency unit, 365 days was used for the estimation.
- 3) Unit prices as well as prices for consumable are calculated based on the Medical Cost of Japan.
- 4) The depreciation of equipment according to the time of durability is taken into consideration for this estimation.
- 5) The frequency of required technical services is estimated based on the most recommendable conditions of maintenance set out for each equipment. As for spare parts, the estimation is difficult since its kind and quantity may vary depending on how the equipment is used. Therefore, the estimation given in this report is based on a "standard" which is commonly applicable for each equipment respectively. Regarding consumable, its precise amount of consumption is also hard to be estimated and thus a given "standard" was applied.
- 6) According to the above conditions, the estimation of direct costs required for the hospital was made based on the results of site study on the performance of the hospital. The base of calculating figures is borrowed from the Medical Costs in Japan. The costs for examination and clinical services vary depending on disease patterns. Therefore, for the estimation purpose, an average cost for a patient was computed according to Japanese experience, and then it was multiplied by the number of patients, adjusting from hospital's current activity data. This estimation will help for computing necessary budget (incremental recurrent cost to be incurred) prepared by the Indian side.

MATERIAL COST ESTIMATION FOR HOSPITAL SERVICES (REFERENCE ONLY) (PRICE AT JP. YEN)

NO.	ITEM	UNIT COST	PATIENT NO.	AMOUNT/DAY	WORKING DAYS	TOTAL	REMARKS
1	Out Patient	38	3,000	114,000	300	34,200,000	Assorted materials for treatment
					Sub-Total	34,200,000	
2	Clinical Test:						
	General Exam.	50	300	15,000	300	4,500,000	Assorted glassware & reagent
	Hematology Exam.	95	300	28,500	240	6,840,000	Assorted glassware & reagent
	Chemical Exam.	100	300	30,000	240	7,200,000	Assorted glassware & reagent
	Histopatho Exam.	130	100	13,000	240	3,120,000	Assorted glassware & reagent
	Immunological Exa	850	80	68,000	240	16,320,000	Reagent & others
	Bacteriological Exa	700	100	70,000	240	16,800,000	Agar, reagent & others
					Sub-Total	54,780,000	
3	Physical Exam:						
	ECG	85	50	4,250	240	1,020,000	Recording paper, etc.
	EMG	200	20	4,000	100	400,000	Recording paper, needles, etc.
	EEG	350	20	7,000	100	700,000	Recording paper, electrode, etc.
	Respirator Test	50	30	1,500	100	150,000	Recording paper, electrode, etc.
	X-ray Test 1	350	300	105,000	300	31,500,000	3 sheets (bone)
	X-ray Test 2	550	200	110,000	300	33,000,000	1 sheet (chest)
	X-ray Test 3	550	50	27,500	300	8,250,000	4 sheets (head)
	X-ray Test 4	350	15	5,250	240	1,260,000	6 sheets (digest)
	X-ray Test 5	550	3	1,650	100	165,000	4 sheets (angio)
	X-ray Test 6	380	20	7,600	240	1,824,000	Burum
	X-ray Test 7	6,000	3	18,000	100	1,800,000	Others
					Sub-Total	80,069,000	
4	Ultrasound Exam.	250	40	10,000	240	2,400,000	Poraloid film
					Sub-Total	2,400,000	
5	Operation Dept.						
	Minor Operation	3,000	75	225,000	300	67,500,000	Assorted materials for operation
	Middle Operation	8,000	35	280,000	240	67,200,000	such as anesthesia gas, drug.
	Major Operation	15,000	10	150,000	200	30,000,000	monitoring device, IV set, etc.
					Sub-Total	164,700,000	
					Grand Total	336,149,000	



## 2-3 Technical Cooperation

Technical cooperation is not involved in the Project, however, the Equipment to be provided under the Project will include the equipment which the staff of the hospital has not operated before. These new equipment is categorized as the modern equipment for which new technology is applied.

In the course of the discussions made with the personnel of Osmania General Hospital, they understood the necessity of the diagnosis know-how on the image diagnosis and tests and analysis ability to be applied to the new Equipment, for which some refreshing training would be planned. They also acknowledged the necessity of the maintenance works of the Equipment by the present hospital staff and also upgrading of their technical skills, for which dispatching of their staff to receive overseas training in Japan.

The team explained the application procedures to be submitted by the Indian side to the Government of Japan for this overseas training in Japan. At the same time the expected results made from the Technical Cooperation executed in relation with this Project were discussed.

Number of Trainees : 3

Field of Training - A- : Doctor/Image Diagnosis Technology

- B - : Doctor/Laboratory Analysis Technology

- C - : Biomedical Engineer/Maintenance technique

## CHAPTER 3

### BASIC DESIGN

## **CHAPTER 3**

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### 3-1 Design Policy

The equipment list requested by the Osmania General Hospital was discussed in accordance with the team's viewpoint under the Japanese Grant Aid Policy. The series of discussions were held with the responsible personnel in charge of the Hospital.

The points of the design policy are as summarized as follows;

The Osmania General Hospital, first of all, set up the essential equipment such as sterilization apparatus and microscope to regain the original function once she performed. And next stage, tertiary care equipment such as MRI, X-ray CT Scanner are planned to facilitate within the medium range of hospital master plan.

- (1) The equipment selected as highest priority equipment is the ones by which services for the patients of casualty and treatment of the trauma cases will be made. Thought the equipment required for the clinical tests, treatment and research works must be improved as they too deteriorated to utilize for the services of the Hospital, the priority would be set on the improvement of the health services for the most of the daily patients who visit for the same cases stated above.
- (2) The overlapping and duplication with the assistance from the World Bank should be avoided.
- (3) The equipment should be selected in view of the technical and financial burdens to be incurred to the hospital management after the equipment provision is made.
- (4) The availability of the maintenance works of the Hospital should be considered for the selection of the specifications of the equipment. (for example, the availability of the parts/consumable, and in-hospital maintenance ability and/or skills of the maintenance service agent)
- (5) The equipment for which some facility renovation is required, was excluded, i.e., the equipment requires Radio Isotope at operation, was excluded as it is the cause of the environmental issues.

### 3-2 Study and Examination in Design Criteria

According to the policy and objectives mentioned above, the following items are considered as our prime rules of conduct for the site survey.

- 1) A proposed plan of the project and the scope of works are prepared to submit prior to the site survey including an implementation programme for the improvement for the most demanded and urgent services of all expected medical services of treatment, research, training, and preventive activities.
- 2) The agenda of the meeting were discussed primarily on the 'ready-made' equipment list designed for the "general diagnosis and treatment for common diseases" of the project site (Though it is understandable that there is necessity of advanced medical services for some special diseases and uncommon diseases, it does not meet the feasibility specified in Japanese grant-aid policy, which stresses the importance of most beneficial projects).
- 3) Equipment to be used for tertiary health care services, such as cardiosurgery and neurosurgery should not be included as these treatment, which sometimes regarded as cost-intensive treatment, will produce low cost effectiveness.
- 4) Equipment for the diagnosis and treatment of non-communicable diseases such as cancer and aging diseases should be given lower priority. This may be legitimized from a result of the study that most of patients coming to the outpatient department need diagnosis and treatment for emergent and acute diseases and trauma.

In accordance with the design policy of Japanese grant-aid, the following design criteria is to be applied for designing an appropriate equipment plan.

The criteria should

- 1) focus on the improvement of the most required and urgent medical services.
- 2) be oriented to improve the "general diagnosis and treatment for common diseases" of the project site.
- 3) in principle, give low priority to special diagnostic equipment used for tertiary health care, which produces relatively low cost-benefits.
- 4) give high priority to essential medical equipment used for emergent and serious sickness and accidental trauma, which occupy the major part of medical services of the hospital.

With full consideration of the above criteria, the study team analyzes the statistical data and information collected in the survey including the education services from both technical and financial points of view, and designs an appropriate equipment plan to be able to produce benefits most effectively.

As for the maintenance of the medical equipment which is very important for proper running of the hospital, any permanent staff in charge of maintenance of medical equipment are not arranged and a medical engineer (bio-medical engineer) belonging to the maintenance section in the state of A/P is undertaking the visiting services to every public hospital in all over the state. Therefore, in case of emergency, the hospital has to contract out. There are also no assigned staff for the maintenance of building, plumbing and electricity. Instead, one each engineer in charge of construction and plumbing is permanently dispatched from the Public Works Department to each of the main building. In addition, only one engineer in charge of electricity is dispatched to the whole hospital. Below each of the engineer, there are 4 or 5 inspectors who are supervised by the superintendent or the representative of administration section.

Viewing from the hospital management condition of beds for patients, stretchers for patients and carts for commodity which are, in general, regarded to be repairable in the hospital, the ability of repairing equipment is poor. The hospital presented a bid defect though it is large with having more than 1000 beds.

The reagent for clinical examination can be purchased in India and by import. Actually it is purchased from the agents in Hyderabad, Bombay and Madras. Furthermore, in order to import consumable, 3 to 6 months will be necessary to get the approval from the Andhra Pradesh State Government.

The criteria of the above conditions are;

- i) Team oriented Care System currently introduced to the teaching hospitals in Japan is not in effect in Osmania General Hospital. Therefore, the request of the same equipment can be avoided. The duplication of the equipment in each department is carefully observed at the selection of the equipment in grade and also quantity, for example, Biochemical Analyzer, Blood Gas Analyzer, Ultrasound Unit, Patient Monitor and Defibrillator and etc.
- ii) The equipment necessary for urgent care services should be ranked at the top priority group. The requested equipment should be reconsidered to review considering this concept.
- iii) Manpower allocation, maintenance load and availability along with the disease pattern of the Hospital should be considered at the equipment planning to improve the health care services as the referral hospital.

- iv) The maintenance of the major equipment such as X-ray Apparatus and Ultrasound Unit should be involved in the course of the equipment planning, as the after sales services by its manufacturers are inevitable.
- v) Sterilization, nursing care system, delivery of the drugs and medical materials as the hospital management are not functionally controlled, causing the hospital function underutilized. Therefore, the equipment for central sterilized supply, laundry, material waste processing and ancillary services will be planned.
- vi) Stability of the power source and voltage are definitely required to operate the medical equipment. Uninterrupted Power Supply should be provided for some equipment.

### 3-3 Basic Plan (Equipment)

The team had studied the content of the request from each department, and proposed an appropriate equipment plan with giving each priority to every equipment according to the design criteria defined above.

The priority according to the criteria can be classified into the following three categories.

- A ---- First priority - should be included
- B ---- Second priority - should be investigated further more
- C ---- Third priority - should be given low priority in this project

The content of discussions is summarized as follows:

1. R.I. equipment are hardly acceptable.
2. Equipment for Cath-Lab. should be given low priority "C" since there is already X-ray D.S.A. system in the hospital. However, a professor using this equipment requested the reconsideration of the inclusion of another one of this kind in the list, stressing that the requested equipment is "bi-plane" type different from the existing one ("single-plane").
3. Regarding MRI, the hospital strongly requested it with explaining the reason of the request that the hospital has to provide tertiary health care services as well as training for medical staff as a top teaching hospital of Osmania Medical College in South India. The hospital stressed that it had received a large number of patients and had already advanced skills to handle the requested equipment.
4. X-ray CT was requested by the hospital as there was a high demand for the patients, and appropriate treatment could not be provided in other institutions while the

number of accident causing head injury increased. However, the hospital agreed to give priority "B" in view of the following two points; firstly the team's design policy specifies that high priority should be given to simple and common medical equipment, secondly if this equipment would be introduced, large amount of incremental operational maintenance cost would be necessitated and become burden on the financial condition of the hospital as well as Andhra Pradesh state government.

Major equipment to be supplied under this project was requested upon discussions made which indicated three high priority items and eight low priority items.

The former three are;

- 1) the equipment to be utilized for treatment of the common diseases,
- 2) the equipment to be replaced with the existing equipment which is already deteriorated,
- 3) the essential equipment for primary health care identified by the World Bank, WHO, UNICEF, etc.

The latter eight are;

- 1) the equipment not required for health care services such as diagnosis treatment and prevention,
- 2) the simple equipment/furniture available locally,
- 3) the most advanced equipment to be utilized for research activities,
- 4) the equipment with some difficulties on installation/infrastructure conditions,
- 5) the expensive equipment less utilized because of small number of testing/less number of patients,
- 6) the equipment hazardous to environmental control,
- 7) the equipment only utilized with exclusive reagent kit available from the specific manufacture, and
- 8) the equipment with financial/marketing difficulties on the procurement of consumable and spare parts, etc.

The priorities of 3 markings are summarized as follows:

- A: Necessity confirmed - items to be utilized for the services of the common diseases ;  
Adequacy confirmed - items already deteriorated and shortage in quantity
- B: Necessity/Adequacy to be reviewed - low priority items
- C: Not eligible



### Quantity

Requested quantity of each equipment is shown in the ANNEX-I of the same Minutes by adjusting based on the clinical activity data of the Hospital. The quantities of the consumable for each equipment are estimated. Required time lag for maximum 6 months after handing over to the hospital under the foreign currency disbursement by the Andhra Pradesh State Government will requires 6 months or so after its application. Exact quantities will be adjusted upon consideration of the current activities such as routine work load/operational conditions and so on.

### Facility work demarcation

The demarcation at the time of installation will be allotted with the estimation of the costs based on the drawings provided by the Hospital and the unit labor cost provided by the Public Works Department. These works should be undertaken by the Indian side.

Major Equipment by the department is as follows:

#### Radiology Department

X-ray Photographic System with DSA

Mammographic X-ray System

X-ray System

Mobile X-ray System

Color Doppler

Ultra Sonography

#### Endocrinology Department

Endoscopy with TV System

#### Clinical Laboratory

Autoanalyzer

Blood Gas Analyzer

Spectrophotometer

Elisa Reader

Auto Blood Cell Counter

Centrifuge

#### Anesthesiology Department

Ventilator

#### CSSD

Steam Sterilizer

EOG Sterilizer

#### Emergency Department

Mobile X-ray Machine

Cardiology Department

Telemetry Monitor Set

Holter Monitoring System

Polygraph

Stress Test System

Cardio and Thoracic Surgery Department

C-arm X-TV Apparatus

Medicine Department

Patient Monitor

Endocrinology Department

ELISA Reader

Nephrology Department

Hemodialysis Machine

Neurology Department

EEG Machine

Neurosurgery Department

Laser CO2 & NdYAG

CUSA

Urology Department

Laser Lithotripter

General Surgery Department

TV Video Endoscopy

Ultrasound for Surgery

Dermatology Department

Carbondioxide Laser NdYAG

Administration Office

Ambulance

Automatic Washer with Extractor

Incinerator

## EQUIPMENT LIST

NO	DESCRIPTION	A			B/C							PRIORITY	Q'TY	
		I	II	III	I	II	III	IV	V	VI	VII			VIII
100	RADIOLOGY DEPARTMENT												A	1
108	COLOR DOPPLER USG	○											A	1
109	ULTRA SONOGRAPHY												A	1
110	PROCESSING TANK	○	○										A	1
112	FILM DUPLICATOR	○											A	1
200	ENDOSCOPY													
201	TV VIDEO ENDOSCOPY SET	○										○	A	1
203	UPPER GI FIBERSCOPE, TV TYPE (INFANT)	○										○	A	1
204	UPPER GI FIBERSCOPE, TV TYPE (ADULT)	○										○	A	2
205	UPPER GI FIBERSCOPE, NORMAL (ADULT)	○	○										A	1
206	DUODENO FIBERSCOPE, TV TYPE	○	○										A	1
207	COLONO FIBERSCOPE, TV TYPE	○	○										A	1
208	SIGMOID FIBERSCOPE, NORMAL	○	○										A	1
209	LIGHT SOURCE	○	○										A	1
211	ENDOSCOPIC FILM VIEWER	○											A	1
212	ENDOSCOPIC/PROCTOSCOPIC TABLE	○	○										A	1
213	FIBERSCOPE CLEANING MACHINE	○											A	1
214	ENDOSCOPIC TROLLEY	○											A	2
218	S.G. DILATORS SET	○	○										A	2
219	PNEUMATIC DILATORS SET	○	○										A	1
220	ESOPHAGEAL MANOMETER	○											A	1
	CLINICAL LABORATORY													
300	BIOCHEMISTRY													
301	AUTOANALYZER	○	○									○	A	1
302	BLOOD GAS ANALYZER, AUTOMATIC	○										○	A	2
303	ELECTROLYTE ANALYZER	○										○	A	2
304	SPECTROPHOTOMETER, DOUBLE BEAM	○											A	1
305	ELECTROPHORESIS / SCANNER	○	○										A	1
306	REFRIGERATED CENTRIFUGE (20,000RPM)	○											A	1
307	SPECTROPHOTOMETER, SINGLE	○	○										A	2
308	ELECTRICAL BALANCE	○											A	2
309	pH METER	○											A	1
310	FREEZER (-20°C)	○											A	1
311	SEMI AUTOANALYZER	○											A	1
312	CHLORIDE METER	○										○	A	1
313	ICE CUBE MACHINE (70KG/DAY)	○											A	1
314	PERSONAL COMPUTER / PRINTER	○		○									A	2
400	MICROBIOLOGY													
401	ANALYTICAL BALANCE	○											A	1
402	UV LAMPS	○											A	5
403	LAMINAR FLOW (100CM WIDE)	○		○									A	1
404	BINOCULAR MICROSCOPE FOR CLINICAL TEST	○	○										A	10
406	FLUORESCENT MICROSCOPE W/PHOTO ATTACH.	○											A	1
407	ELISA READER	○											A	1
409	IMMUNOELECTROPHORESIS	○	○										A	1
410	ANAEROBIC STATION / GAS CYLINDER	○	○										A	1
412	FREEZER (-20°C)	○											A	1
413	REFRIGERATORS (CAP 200L)	○											A	4
414	WATER BATH WITH SHAKER	○											A	2
415	VERTEX MIXER	○	○										A	1
416	FREEZE DRYER	○											A	1
417	MICRO PIPETTES SET	○											A	1
419	INCUBATOR (60CM WIDE)	○		○									A	2
420	VERTICAL AUTOCLAVE	○	○										A	2
421	HOT AIR STERILIZER (60CM WIDE)	○	○										A	2
422	CO2 INCUBATOR	○											A	1
423	CENTRIFUGE, TABLE TOP (4,000RPM)	○	○										A	3
424	STEREO MICRO SCOPE	○	○										A	1
426	pH METER	○											A	1
427	ULTRASONIC CLEANER (TABLE TYPE)	○											A	1
500	PATHOLOGY													
501	FLUORESCENT MICROSCOPE	○											A	1
502	TISSUE PROCESSOR	○		○									A	1
503	AUTOMATIC STAINER	○											A	1
504	MICROTOME SEMIAUTOMATIC / SHARPENER	○	○										A	1
505	CRYOSTAT	○	○										A	1
506	BLOOD CELL COUNTER	○											A	2
508	LEUKOCYTE COUNTER	○											A	1
510	BINOCULAR MICROSCOPE FOR STUDENT	○	○	○									A	20
511	TEACHING MICROSCOPE FOR 5 PERSONS	○											A	1

**EQUIPMENT LIST**

NO	DESCRIPTION	A			B/C							PRIORITY	Q'TY		
		I	II	III	I	II	III	IV	V	VI	VII			VIII	
512	TRINOCULAR MICROSCOPE / CAMERA	○												A	1
514	PERSONAL COMPUTER / PRINTER			○										A	1
516	DEEP FREEZER (-80°C)	○												A	1
517	REFRIGERATOR (CAP 200L)	○	○											A	3
518	TABLE TOP CENTRIFUGE (4,000RPM)	○		○										A	3
519	HEMATOCRIT CENTRIFUGE	○	○	○										A	1
520	HIGH SPEED CENTRIFUGE (12,000RPM)	○												A	1
525	ELECTRONIC BALANCE	○		○										A	1
526	REFRIGERATED CENTRIFUGE (20,000RPM)	○	○											A	1
527	DOUBLE DISTILLATION PLANT	○	○	○										A	1
<b>600</b>	<b>BLOOD BANK</b>														
601	TABLE TOP CENTRIFUGE (4,000RPM)	○	○	○										A	1
602	REFRIGERATED CENTRIFUGE (20,000RPM)	○												A	1
603	CENTRIFUGE HEAVY DUTY (5,000RPM)	○		○										A	1
604	INCUBATOR (60CM WIDE)	○	○	○										A	1
605	REFRIGERATOR (CAP 450G BLOOD PACK 120PACKS)	○	○	○										A	2
606	REFRIGERATOR MEDIUM (CAP 250L)	○												A	2
607	MICROSCOPE BINOCULAR	○		○										A	1
608	B.P. APPARATUS	○	○	○										A	2
609	BLOOD SCALE (4KG/10G SENSITIVE)	○												A	4
610	MICRO PIPETTE	○												A	2
611	B.P. APPARATUS BED SIDE	○	○	○										A	2
613	DEEP FREEZER (-70°C)	○												A	1
614	GENERATOR MINI (15KW)	○												A	1
615	PLATELET AGITATOR	○		○										A	1
616	DOUBLE DISTILLATION PLANT	○	○	○										A	1
617	LAMINA FLOW	○												A	1
618	PERSONAL COMPUTER / PRINTER			○										A	1
<b>700</b>	<b>ANESTHESIOLOGY (OPERATION THEATER)</b>														
701	VENTILATOR (ADULT)	○	○											A	2
703	PULSE OXIMETERS	○												A	3
704	MULTI-CHANNEL TEMPERATURE MONITOR	○												A	6
705	CO2 MONITOR	○												A	3
706	BLOOD GAS ANALYZER	○												A	1
707	TEMPERATURE CONTROL BLANKET (BLANKET 3 SIZES)	○												A	4
710	PULMONARY FUNCTION MONITOR	○												A	1
711	ANESTHESIA APPARATUS / VENTILATOR	○	○											A	6
712	C-ARM X-RAY UNIT MOBILE	○												A	1
713	OPERATING TABLE, UNIVERSAL TYPE	○	○	○										A	6
714	OPERATING LIGHT / MOBILE	○	○	○	○									A	6
715	DIATHERMY (ELECTRO SURGICAL UNIT)	○	○	○										A	6
716	DEFIBRILLATOR	○	○											A	3
717	REFRIGERATOR (CAP 250L)	○		○										A	7
718	PATIENT MONITOR (4CH TYPE)	○												A	6
719	STRETCHER	○	○											A	10
720	SURGICAL SCRUB STATION, 2	○												A	6
<b>800</b>	<b>CSSD</b>														
801	STEAM STERILIZER (LARGE) 27CM DIA. DRUM 12PCS	○	○											A	2
802	STEAM STERILIZER (SMALL) 27CM DIA. DRUM 6PCS	○	○											A	1
803	ULTRASONIC CLEANER	○												A	1
804	TUBE DRYER	○												A	1
806	INSTRUMENT CABINET		○	○	○									A	6
807	SHELVES		○	○	○									A	6
808	CARRYING CART		○	○	○	○								A	6
809	EOG STERILIZER	○												A	1
810	EO GAS AERATOR	○												A	1
<b>900</b>	<b>EMERGENCY</b>														
901	OPERATING TABLE / STRETCHER	○		○										A	2
902	MINOR OPERATING LIGHT / FIXED STAND	○	○	○										A	2
903	ANESTHESIA APPARATUS WITHOUT VENTILATOR	○	○											A	2
904	BEDSIDE MONITOR / 2 CH	○												A	2
905	DEFIBRILLATOR	○												A	2
906	VENTILATOR	○		○										A	2
907	EMERGENCY CART			○										A	2
908	MOBILE X RAY MACHINE	○		○										A	1
<b>1000</b>	<b>CARDIOLOGY</b>														
1001	BEDSIDE MONITOR CARDIAC FOR I.C.U (ASSEMBLY)	○												A	1
1007	VENTILATORS	○												A	2
1008	2-D ECHO	○												A	1

EQUIPMENT LIST

NO	DESCRIPTION	A			B/C							PRIORITY	Q'TY	
		I	II	III	I	II	III	IV	V	VI	VII			VIII
1013	HOLTER MONITORING SYSTEM	○											A	1
1014	AMBULATORY B.P. MONITOR, NON INVASIVE	○											A	2
1015	BLOOD GAS ANALYZER, 3P	○							○				A	1
1017	PATIENT TROLLEYS	○	○										A	3
1019	C-ARM BEDSIDE IMAGE INTENSIFIER	○											A	1
1020	ACTIVATED CLOTING TIME UNIT	○							○				A	1
1025	ECG, 6-CH	○											A	1
1028	STRESS TEST SYSTEM	△	○										A	1
1029	TREADMILL	○											A	1
1100	CARDIO & THORACIC SURGERY													
1101	CARDIAC MONITOR FOR OPERATION THEATRE TYPE	○											A	1
1105	BLOOD AUTO TRANSFUSION PUMP	○											A	2
1106	FREEZER (-20°C)	○					○						A	1
1107	FINE VASCULAR INSTRUMENTS SET	○	○										A	2
1108	4 CHANNEL MONITOR	○											A	2
1110	OPERATING TABLE (UNIVERSAL TYPE)	○	○	○									A	4
1111	OPERATING ROOM CEILING LIGHTS 9 BULB TYPE	○		○									A	4
1112	SUCTION FOR OPERATION THEATRE TYPE	○		○									A	6
1113	DIATHERMY MACHINE (ELECTRIC SURGICAL UNIT)	○		○									A	2
1114	BRONCHOSCOPE SET / LIGHT SOURCE	○											A	1
1116	SPIROMETER	○											A	1
1200	ORTHOPEDIC													
1201	ORTHOPEDIC OPERATION TABLE	○		○									A	1
1202	SPINAL STABILIZATION INSTRUMENTATION SET	○	○										A	1
1203	SCOLIOSIS CORRECTION INSTRUMENTATION SET	○	○										A	1
1204	PNEUMATIC POWER DRILL	○											A	2
1205	TOTAL KNEE REPLACEMENT INSTRUMENTATION SET	○											A	1
1208	FRAGMENT FIXATION SETS MINI	○	○										A	1
1209	FRAGMENT FIXATION SETS MAXI	○	○										A	1
1210	ILIZAROV EXTERNAL FIXTURE SYSTEMS	○											A	3
1212	FREEZER (-20°C)	○					○						A	1
1213	REFRIGERATOR FOR ORTHOPEDIC	○	○										A	1
1216	ARTHROSCOPE WITH SURGERY INSTRUMENTATION	○											A	1
1219	TRANSCUTANEOUS NERVE STIMULATOR	○		○									A	1
1221	ULTRASONIC AND LOW FREQUENCY COMBINATION THERAPY	○		○									A	2
1222	TRACTION UNIT	○	○	○									A	2
1223	ULTRA VIOLET THERAPY UNIT	○		○									A	1
1224	MUSCLE AND NERVE STIMULATOR	○		○									A	1
1225	HIGH FREQUENCY THERAPY UNIT	○	○	○									A	1
1226	ULTRA SOUND THERAPY UNIT	○		○									A	1
1227	ELECTRIC BODY VIBRATORS	○		○									A	1
1231	REFRIGERATOR FOR REHABILITATION	○	○	○									A	1
1236	OPERATING RETRACTOR LIGHT	○											A	1
1300	MEDICINE													
1303	ANALYTICAL BALANCE (CAP 200MG)	○					○						A	1
1304	CENTRIFUGE (4,000RPM)	○		○									A	1
1305	BINOCULAR MICROSCOPE	○		○									A	2
1307	HEMOGLOBINOMETER	○											A	1
1310	B.P. APPARATUS (TABLE TOP TYPE)	○											A	10
1311	ECHOGRAPHY, PORTABLE	○	○										A	1
1312	PULSE OXYMETER	○		○									A	1
1313	DEFIBRILLATOR	○											A	1
1314	VENTILATOR	○											A	2
1319	NEBULIZER, NORMAL TYPE	○											A	5
1321	INFUSION PUMPS	○	○										A	3
1400	ENDOCRINOLOGY													
1402	FREEZER (-20°C)	○											A	1
1403	REFRIGERATED CENTRIFUGE (20,000RPM)	○					○						A	1
1405	LABORATORY CENTRIFUGE (4,000RPM) TABLE TOP TYPE	○											A	1
1406	SINGLE PAN BALANCE (CAP 200G)	○											A	1
1407	PHOTOELECTRIC COLORIMETER	○											A	1
1408	pH METER	○											A	1
1409	AUTO PIPETTE	○											A	4
1410	VERTEX MIXTURE	○											A	5
1411	MAGNETIC STIRRER	○											A	2
1413	ELISA READER	○											A	1
1414	PERSONAL COMPUTER / PRINTER	○		○									A	1
1415	INFUSION PUMP	○											A	2
1416	DOUBLE DISTILLATION PLANT	○	○	○									A	1

## EQUIPMENT LIST

NO	DESCRIPTION	A			B/C							PRIORITY	Q'TY				
		I	II	III	I	II	III	IV	V	VI	VII			VIII			
1500	NEPHROLOGY																
1501	HAEMODIALYSIS MACHINES (FOR SINGLE PATIENT)	○	○												A		2
1504	PHASE CONTRAST MICROSCOPE W/CAMERA	○					○								A		1
1505	ELECTROLYTE ANALYZER	○													A		1
1506	BINOCULAR MICROSCOPE	○	○	○			○								A		2
1507	pH METER	○													A		1
1508	NEEDLE BIOPSY SET	○	○	○											A		1
1600	NEUROLOGY																
1601	EEG MACHINE, 2 CH	○					○								A		1
1602	EMG / EVOLVED POLENET, 8 CH	○					○								A		1
1700	NEUROSURGERY																
1701	OPERATING MICROSCOPE	○													A		1
1703	C.U.S.A	○											○		A		1
1704	OPERATING LOUPES	○													A		2
1800	UROLOGY																
1801	CYSTOSCOPE, FLEXIBLE SET	○		○											A		1
1802	PEDIATRIC CYSTOSCOPE, RESECTOSCOPE SET	○													A		1
1803	LASER LITHOTRIPTOR OUTPUT 60W(Nd YAG 10.0)														A		1
1805	UROLOGY OPERATING TABLE	○	○	○											A		1
1900	PLASTIC SURGERY																
1901	OPERATING MICROSCOPE FOR PLASTIC SURGERY	○		○											A		1
1902	INSTRUMENTS FOR MICROSURGERY	○	○	○											A		1
1905	TISSUE EXPANDERS SET	○	○	○											A		1
1906	LIPOSUCTION UNIT	○													A		1
1907	INTERNAL FIXATION SYSTEM FOR M.F. SURGERY	○	○	○											A		2
1908	DOPPLER UNIT FOR MAPPING	○													A		1
1909	RIPPLE BEDS & AIR FLUIDISHED BEDS	○													A		2
1910	SKIN GRAFTS MESHER	○													A		1
1911	NAESENDOSCOPE W/LIGHT SOURCE	○		○											A		1
1912	INFRA-RED LAMP STAND TYPE	○		○											A		1
2000	GENERAL SURGERY																
2005	KENTO LIFT RETRACTOR FOR LIVER SURGERY	○	○												A		2
2006	SILICON RUBBER CLAMPS FOR HEPATIC SURGERY	○	○												A		2
2007	ULTRASOUND FOR SURGERY	○													A		1
2008	TV SYSTEM FOR OPERATION THEATER / VIDEO	○													A		1
2010	PORTABLE ULTRASOUND MACHINE	○		○											A		1
2100	DERMATOLOGY																
2102	BINOCULAR MICROSCOPE	○	○	○											A		1
2103	BINOCULAR MICROSCOPE / DARK FIELD	○		○											A		1
2104	WOODSLAMP	○		○											A		1
2105	DIATHERMY FOR DERMATOLOGY	○		○											A		2
2106	IONTOPHORESIS APPARATUS (MADE IN INDIA)	○		○											A		1
2107	DERMABRADARS	○		○											A		1
2108	ULTRAVIOLET CHAMBERS UVA & UVB LAMPS	○		○											A		1
2109	CARBONDIOXIDE LASER NdYAG	○													A		1
2200	ADMINISTRATION																
2201	AMBULANCE CAR / STANDARD EQUIPPED														A		2
2202	PERSONAL COMPUTER / PRINTER			○											A		1
2203	COPIER			○											A		1
2204	FAX MACHINE			○		○									A		1
2206	AUTOMATIC WASHER WITH EXTRACTOR	○	○												A		1
2207	HOT AIR DRYER (LAUNDRY)	○	○												A		1
2208	INCINERATOR	○	○			○									A		1
2209	ELECTRIC TYPEWRITER	○													A		1