quantity has been planned based on that one equipment should be provided to group of two to six persons.

(7) Architecture Department

Major equipment excluding drawing apparatus will be used by unit of one to four groups. While 48 drawing tables will be installed in each drawing class room, because at the class each person must use one set of drawing apparatus. Therefore, total number of drawing tables will be 192. The quantity of parallel rule drafting set, drafting instrument for architecture and that for mechanics, which should be used by each trainee in turn between architectural class and mechanical class, has been planned to be ninety six respectively.

(8) General science

Chemistry and physics classes are carried out in two laboratories which have the same equipment. All of the experiment will be done basically by group. Equipment in this class have been classified into several groups, i.e., some equipment are used by the class as a whole and some are used by four to twelve groups respectively. The quantity of each equipment has been determined, considering frequency of use by each group based on the contents of experiment.

(9) Supporting educational equipment

Common equipment used by all the departments such as machines for teaching materials and audio-visual aids shall be provided in such common space as main office, AV room, library, etc. as required.

4.3.2 Equipment List

The list of the equipment supplied in this Project is shown separately for each field from the next page. The equipment list includes the name, use, quantity, and layout of the equipment. The rooms where the equipment are installed are indicated by the abbreviated letters in the list. The corresponding names are shown in the following Table (See APPENDIX 2.8).

TABLE 4.6 LIST OF ROOM LAYOUT

(1/2)

Room name		Floor
COMPUTER ENGINEERING		
CO-A	MICRO COMPUTER LAB.	3
CO-B	DIGITAL CIRCUIT LAB.	3
CO-C	COMPUTER CONTROL LAB.	3
CO-D1	PERSONAL COMPUTER ROOM 1	3
CO-D2	PERSONAL COMPUTER ROOM 2	3
CO-D3	PERSONAL COMPUTER ROOM 3	3
CO-D4	PERSONAL COMPUTER ROOM 4	3
CO-D5	PERSONAL COMPUTER ROOM 5	3
CO-D6	PERSONAL COMPUTER ROOM 6	3
CO-E	CAD ROOM	2
CIVIL ENGINEERING		
CV-A	SOIL MECHANICS LAB.	1
CV-B	MATERIAL TESTING LAB.	1
CV-C	CIVIL ENGINEERING TECHNOLOGY LAB.	1
CV-D	PLUMBING TECHNOLOGY LAB.	1
CV-E	SURVEYING INSTRUMENTATION ROOM	2
MECHANICAL ENGINEERING		
MC-A	MECHANICAL DESIGN ROOM	1
MC-B	AUTOMOTIVE SHOP	1
MC-C	FOUNDRY AND WELDING SHOP	1
MC-D	POWER AND STEAM LAB.	1
MC-E	MACHINE SHOP	1
MC-F	THERMO-DYNAMIC LAB.	1
MC-G	FLUID AND HYDAULIC LAB.	1
MC-H	REFRIGATION LAB.	1
INDUSTRIAL ENGINEERING		
IN-A	TIME AND MOTION LAB.	2
IN-B	PHOTOGRAPHY LAB.	2
IN-C	PRINTING LAB.	2
ELECTRICAL ENGINEERING		
EL-A	ELECTRICAL FUNDAMENTAL LAB. 1	3
EL-B	ELECTRICAL FUNDAMENTAL LAB. 2	3
EL-C	AUTOMATIC CONTROL LAB.	3
EL-D	POWER ELECTRICAL LAB.	1
EL-E	ELECTRICAL WORKSHOP	1
ELECTRONICS & COMMUNICATION ENGINEERING		
ER-A	ELECTRONICS FUNDAMENTAL LAB. 1	3
ER-B	ELECTRONICS FUNDAMENTAL LAB. 2	3
ER-C	TV AND RADIO COMMUNICATION LAB.	3
ER-D	ELECTRONICAL WORKSHOP	3

Room name		Floor
ARCHITECTURE		
AT-A	MODEL ROOM	2
AT-B	TROPICAL DESIGN ROOM	2
AT-C	VISUAL TECHNICS ROOM	2
AT-D	BUILDING TECHNOLOGY ROOM	2
AT-E1	ARCHITECTURE DRAFTING ROOM 1	2
AT-E2	ARCHITECTURE DRAFTING ROOM 2	2
AT-F1	MECHANICAL DRAFTING ROOM 1	2
AT-F2	MECHANICAL DRAFTING ROOM 2	2
GENERAL SCIENCE(PHYSICS)		
GP-A	GENERAL PHYSICS LAB. 1	4
GP-B	GENERAL PHYSICS LAB. 2	4
GENERAL SCIENCE(CHEMISTRY)		
GC-A	GENERAL CHEMISTRY LAB. 1	4
GC-B	GENERAL CHEMISTRY LAB. 2	4
SUPPLEMENTAL EDUCATIONAL EQUIPMENT		
SP-A	AUDIO-VISUAL PREPARATION ROOM	4
SP-B	AUDIO VISUAL ROOM	4
SP-C	FACULTY	1

Equipment List : Computer Engineering

Item	Description	Purpose	Q'ty	Lab. (CO-)									
				A	B	C	D1	D2	D3	D4	D5	D6	E
CO- 1	Personal computer (CAD)	Computer drawing practice	12										12
CO- 2	Mechatoronics trainer	Computer control training	1			1							
CO- 3	Personal computer (Software)	Computer programming practice	96				16	16	16	16	16	16	
CO- 4	Logic analyser (32Ch)	Digital circuit signal analysis	1			1							
CO- 5	Logic circuit trainer	Logical circuit training	4		4								
CO- 6	Microcomputer trainer	Computer application level training	4			4							
CO- 7	Oscilloscope	Wave observation of electric circuit	6		2	4							
CO- 8	Function Generator	Signal source to experimental electric circuit	4			4							
CO- 9	Microcomputer trainer (Fundamental)	Computer basic level training	24	24									
CO-10	Regulation DC power supply (~18V)	Power supply for experimental electirc circuit	8		8								
CO-11	Multitester (Digital)	Measurement of voltage and current of electric circuit	12		8	4							
CO-12	Regulated DC power suplly (+5V, ±15V)	Power supply for micro-computer and related equipments	8			8							
CO-13	Regulated DC power suplly (+5V)	Power supply for micro-computer	24	16	8								
CO-14	Multitester (Analog)	Trouble-shooting of electric circuit	8		8								
CO-15	Logic tester	Trouble-shooting of digital circuit	4		4								
CO-16	Teaching material	Experiment materials (e.g. transistor)	1										
CO-17	Tool set	Production practice and reparing	3	1	1	1							
CO-18	Work table		12	4	4	4							
CO-19a	Table for computer		24				4	4	4	4	4	4	
CO-19b	Table for computer		12				1	1	1	1	1	1	6
CO-20	Table for teacher		1		1								
CO-21	Strorage rack		6	2	2	2							
CO-22	Steel cabinet		13	2	2	2	1	1	1	1	1	1	1
CO-23	Chair		336				48	48	48	48	48	48	48

Equipment List : Civil Engineering

(1/4)

ITEM	DESCRIPTION	Purpose	Q'ty	Lab. (CV-)				
				A	B	C	D	E
CV- 1	Universal testing machine and accessories	Unit strength test of concrete and reinforcement	1		1			
CV- 2	Consolidation test apparatus	Measurement of settlement against soil sample load	1	1				
CV- 3	Automatic briquette tester	Measurement of bending strength and tensile strength of mortar	1		1			
CV- 4	Cement autoclave	Expansion test of cement	1		1			
CV- 5	Electric direct shear apparatus	Single shear test of soil sample	1		1			
CV- 6	Wood turning lathe	Processing and production of forms	1			1		
CV- 7	Soil mixer	Tempering of soil samples	1	1				
CV- 8	Asphalt mixer	Tempering of asphalt	1		1			
CV- 9	Pipe and bolt threading machine	Pipe processing	1				1	
CV- 10	Universal radial cross cut saw	Processing and production of forms	1			1		
CV- 11	Panetration apparatus set	Measurement of hardness of asphalt	1		1			
CV- 12	Bending spring	Pipe processing	1				1	
CV- 13	Vane tester with steel torque rod	Shear friction coefficient of soil sample	1					1
CV- 14	Electoric unconfined compression apparatus	Uniaxial compression test of soil sample	1	1				
CV- 15	CBR test apparatus	Measurement of holding strength of road-bed	1	1				
CV- 16	Large capacity oven (thermo controlled type)	High-temperature drying of samples and units (large size)	1		1			
CV- 17	Asphalt water bath	Curing of asphalt	1		1			
CV- 18	Bench bender	Pipe processing	1				1	
CV- 19	Vertical band saw	Processing and production of forms	1			1		
CV- 20	Asphalt oven	Measurement of evaporation of asphalt	1		1			
CV- 21	Flow table standard	Measurement of flow rate of mortar	1		1			
CV- 22	Electric digital theodolite	Measurement of height and horizontal angle (electric system)	1					1
CV- 23	Saybolt viscosimeter	Measurement of viscosity	1		1			
CV- 24	Laboratory concrete mixer	Tempering of concrete	1		1			
CV- 25	Transit	Measurement of height and horizontal angle (rolling mirror theodolite system)	1					1
CV- 26	Sample splitter with accessories	Division of aggregate	1	1				
CV- 27	Sieve shaker	Sieving of cement and sand	1		1			
CV- 28	Theodolite	Measurement of height and horizontal angle	1					1
CV- 29	Swedish sounding apparatus	Soil penetration test	1					1
CV- 30	Flaring tool	Pipe processing	1				1	

Equipment List : Civil Engineering

ITEM	DESCRIPTION	Purpose	Q'ty	Lab. (CV-)				
				A	B	C	D	E
CV- 31	Compaction apparatus	Rodding of soil sample	1	1				
CV- 32	Camera set	Photographing	1					1
CV- 33	Price current meter	Measurement of velocity of rivers	1					1
CV- 34	Density and specific gravity test set	Measurement of relative density and absorption of coarse aggregate	1		1			
CV- 35	Ratchet pipe threader	Pipe processing	1				1	
CV- 36	Standard penetration test set	Measurement of penetration resistance of soil sample	1	1				
CV- 37	Clip for briquette	Fixture for tensile test of mortar	1		1			
CV- 38	Automatic level	Measurement of levelling for survey	1					1
CV- 39	Soil auger set	Extraction of soil sample	1	1				
CV- 40	Digital type direct reading balance	Precise measurement	2	1	1			
CV- 41	Three gang mold	Mortal expansion test form	1		1			
CV- 42	Air content apparatus	Measurement of air content in concrete (before hardening)	1		1			
CV- 43	Falling head permeability apparatus	Measurement of permeability coefficient of soil sample	1	1				
CV- 44	Sand density cone apparatus set	Measurement of soil density	1					1
CV- 45	Sextamt	Survey of longitude and latitude	1					1
CV- 46	Asphalt sieve set	Sieving of asphalt	1		1			
CV- 47	Standard 8 briquette mold	Formation of mortar specimen	1		1			
CV- 48	Vicat apparatus	Measurement of mortar setting time	2		2			
CV- 49	Vibrator	Loading concrete into form	1		1			
CV- 50	Planimeter	Guadrature for measurement	4					4
CV- 51	Sieve standard set	Set in CE-27	1		1			
CV- 52	Hand operated soil lathe	Formation of soil sample	2	2				
CV- 53	Three gang mortar beam mold	Mortar bending test	2		2			
CV- 54	Shrinkage limit device	Measurement of shrinkage coefficient of soil sample	4	4				
CV- 55	Tube cutter	Pipe processing	2				2	
CV- 56	Chain pipe wrench	Pipe processing	2				2	
CV- 57	Liquid limit device	Measurement of liquid limit of soil sample	2	1		1		
CV- 58	Unit weight measurer	Measurement of unit building volume and weight of concrete	2		2			
CV- 59	Ring ball type softening point tester	Measurement of softening point of asphalt	1		1			
CV- 60	Beam mold with tamping rod	Concrete sample form (for bending)	2		2			

Equipment List : Civil Engineering

ITEM	DESCRIPTION	Purpose	Q'ty	Lab. (CV-)				
				A	B	C	D	E
CV- 61	Laboratory concrete mixer	Tempering of concrete	2		2			
CV- 62	Slump test set	Measurement of concrete slump	2		2			
CV- 63	Carpentry tools complete set	Processing and production of forms	4			4		
CV- 64	Reamer pipe deburring	Pipe processing	4				4	
CV- 65	Pipe cutter roller pattern	Pipe processing	4				4	
CV- 66	Plane table board with tripod	Survey	4					4
CV- 67	Concrete cylinder mold	Concrete sample form (for compression test)	2		2			
CV- 68	Washing sieve for asphalt	Washing test of asphalt	2		2			
CV- 69	Bench vice	Mechanical work	6		2	2	2	
CV- 70	Graduated cylinder	Measurement of volume	4	2	2			
CV- 71	Soil hydrometer W/ hydrometer jars	Measurement of specific gravity of soil sample	4	4				
CV- 72	Straight edge	Capping at concrete sample formation	4	2	2			
CV- 73	Alidage	Survey	4					4
CV- 74	Air tight container	Sealed vessel for samples	6	4	2			
CV- 75	Glass plate	Measurements for soil samples	6	4		2		
CV- 76	Stop watch	Measurement of time	4	2	2			
CV- 77	Stadia rod	Aluminium pole for survey	4					4
CV- 78	Stereoscope	Survey	4					4
CV- 79	Dessicator	Drying of samples and units	4	2	2			
CV- 80	Wire saw	Formation of soil sample	8			4	4	
CV- 81	Sand absorption cone with rod	Measurement of dried surface of coarse aggregate	8		8			
CV- 82	Spring balance with hook	Measurement	8	2	4	2		
CV- 83	Evaporation dish	Extraction of solids in solution	8	4	4			
CV- 84	Wheel barrow	Carriage of materials	4	2	2			
CV- 85	Chauk	Marker for survey	8					8
CV- 86	Tape measure	Tapes for survey	8					8
CV- 87	Shoyel	For putting samples in vessels	24	8	8			8
CV- 88	Container	Vessels for samples	8	4	4			
CV- 89	Pycnometer	Measurement of density of soil	8	4	4			
CV- 90	Trimming knife	Formation of soil samples	12	4	4	4		

Equipment List : Civil Engineering

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ITEM	DESCRIPTION	Purpose	Q'ty	Lab. (CV-)				
				A	B	C	D	E
CV- 91	Brush for sieve	Cleaning of sieve	8		8			
CV- 92	Range pole	Survey pole	8					8
CV- 93	Plumb bob	Survey plumb	8					8
CV- 94	Floats with accessories	Measurement of water level	2					2
CV- 95	Scoop	Tempering of samples	24	8	8			8
CV- 96	Spray	Moisture fortification	8	4	4			
CV- 97	Thermometer	Measurement of temperature of samples and water in a tank	32	12	8	4		8
CV- 98	Syringe	Injection of mortar	8	4	4			
CV- 99	Sample can	Vessels for samples	8	4	4			
CV-100	Clamp handle for steer tape		8					8
CV-101	Spatula	Treating samples	32	16	16			
CV-102	Marking pin	Pinhole for survey	8					8
CV-103	Tool set	Construction work	8	2	2	2	2	
CV-104	Steel cabinet		12	2	2	2	2	4
CV-105	Storage rack		16	4	4	2	2	4
CV-106	work table		8	2	2	1	1	2

Equipment List : Mechanical Engineering

ITEM	DESCRIPTION	Purpose	Q'ty	Lab. (MC-)							
				A	B	C	D	E	F	G	H
MC- 1	Universal steam prime mover tester	Study of boiler structure and capacity	1						1		
MC- 2	Universal milling machine	Cutting of metals	1					1			
MC- 3	CNC machine	Study of computer control of miller	1	1							
MC- 4	Synthetic hydro experimental unit	Practical training of hydraulics by collecting data	1							1	
MC- 5	Sand sifter	Regeneration of sand	1			1					
MC- 6	Air conditioning laboratory unit	Study of structure and capacity of air-conditioner	1								1
MC- 7	Radial drilling machine	Piercing, Boring and tapping of large-size metals	1					1			
MC- 8	Lathe machine	Processing of cylindric metals (lathing and threading)	1					1			
MC- 9	Universal tool grinder	Resharpening of knives	1					1			
MC- 10	Water to air heat transfer apparatus	Experiments of heat transfer rate	1						1		
MC- 11	Shearing machine	Measured cutting metal boards	1					1			
MC- 12	Refrigeration experimwental equipment	Study of structure and capacity of freezers	1								1
MC- 13	Electornic system universal testing machine	Tension and compression strength test	1					1			
MC- 14	Cam analysis experimental apparatus	Calculation of velocity and acceleration by cam diagram	1				1				
MC- 15	Mechanical press break	Shaping into cans from long metal boards	1					1			
MC- 16	Shot tumblast with dust collector	Surface processing of casted products such as removing fins	1			1					
MC- 17	Training computer lathe	Study of computer control lathes	1	1							
MC- 18	Passenger car chassis (cut-away)	Study of structure of car body	1		1						
MC- 19	Shaping machine	Cutting o9f metal surface and groove	1					1			
MC- 20	Pneumatic experimental machine	Study of structure and capacity of aerodynamic machines such as blowers	1							1	
MC- 21	Hydraulic press	Shaping into cans from metal boards	1					1			
MC- 22	Multipurpos press brake	Shaping into cans from metal boards	1					1			
MC- 23	Water to water exchanger	Heat exchange test	1						1		
MC- 24	Thermal conductivity measuring apparatus	Thermal conductivity measurement test of normal solids	1						1		
MC- 25	Radiation heat transfer experimental apparatus	Measurement of vertical radiation rate	1						1		
MC- 26	Upright drilling machine	Piercing, boring and tapping of medium-size metals	1					1			
MC- 27	Micro hardness tester	Precise mesurement of hardness	1					1			
MC- 28	Forced convection heat transfer apparatus	Heat transfer experiment	1						1		
MC- 29	4-cylinder diesel engine W/ transmission (cut-away)	Study of engine structure	1		1						

Equipment List : Mechanical Engineering

ITEM	DESCRIPTION	Purpose	Q'ty	Lab. (MC-)							
				A	B	C	D	E	F	G	H
MC- 30	Corner shearing machine	Cutting corner parts of metal materials	1					1			
MC- 31	Hack i sawing machine	Cutting of metal materials	1					1			
MC- 32	Motor-driven universal sand strength machine	Strengthening of natural and artificial sand into molding sand	1			1					
MC- 33	Surface plate	Standard of precise measurement	1					1			
MC- 34	RO-TAP seive shaker	Selection of grain size for molding sand	1			1					
MC- 35	Critical revolution experimental apparatus	Measurement of whirling speed of bearing system	1				1				
MC- 36	DC tig welding machine	Welding of metals and non-ferrous metals	1			1					
MC- 37	Nenken type adiabatic bomb calorimeter	Measurement of quantity of heat	1						1		
MC- 38	Profile projector	Measurement of size and form pf work pieces by extended projection	1	1							
MC- 39	Toolmaker's microscope	Measurement of size and form pf work pieces by using microscope	1	1							
MC- 40	Surface roughness tester	Measurement of finishing precision of work pieces	1					1			
MC- 41	2-cycle motor cycle gasoline engine (cut-away)	Study of engine structure	1		1						
MC- 42	Rectangular guage blocks	Measurement standard of precision of work peices	1					1			
MC- 43	Dead weight gage tester	Examination of secondary gauges with standard pressure	1							1	
MC- 44	Quadric-crank chain experimental apparatus	Experiment of crank system	1				1				
MC- 45	Condensing unit	Study of structure and capacity of condenser	1								1
MC- 46	Rotating sand washer	Rinsing of molding sand	1			1					
MC- 47	Automatic muffle furnace	Heat treatment of molding process	1			1					
MC- 48	Absolute thermometer	Measurement of temperature	2						1	1	
MC- 49	Portable air compressor	Supply of compressed air	1					1			
MC- 50	Slider-crank mechanism experimental apparatus	Experiment of crank system	1				1				
MC- 51	Oscilloscope engine ignition analyzer	Measurement of engine capacity	1		1						
MC- 52	Infrared moisture meter	Measurement of propriety of moisture for molding sand	1			1					
MC- 53	Refrigerator	Study of structure and capacity of freezers	1								1
MC- 54	Permeability tester	Measurement of passing capacity of molding sand	1			1					
MC- 55	Immerision pyrometer	Measurement of high temperature (by heat color)	1						1		
MC- 56	Electronic recorder	Continual measurement of temperature	1				1				
MC- 57	Diesel engine fuel injection pump	Study of structure of injection pump of gasoline engine	1		1						
MC- 58	Bench grinder	Grinding of small metal parts	4			2		2			
MC- 59	Sand rammer for sand specimen	Rodding of molding sand into form	1								

Equipment List : Mechanical Engineering

ITEM	DESCRIPTION	Purpose	Q'ty	Lab. (MC-)							
				A	B	C	D	E	F	G	H
MC- 60	Platform scale	Measurement of weight	1				1				
MC- 61	Diesel injection pump	Study of structure of injection pump of Diesel engine	1		1						
MC- 62	Cube ice maker	Study of structure and capacity of ice machine	1								1
MC- 63	Electronic analytical balance	Measurement of precise weight	1				1				
MC- 64	Portable pyrometer	Measurement of high temperature	1						1		
MC- 65	Tool chest with assorted	Practical training	1					1			
MC- 66	Sand testing sieve	Measurement of grain size for molding sand	1			1					
MC- 67	Window type air condition	Study of structure and capacity of wind air-conditioner	1								1
MC- 68	AC arc welding machine	Welding of metals	2			2					
MC- 69	Diesel engine	Study of structure and capacity of Diselengine and assembly study	1		1						
MC- 70	Core hardness tester	Measurement of hardness of molds	1			1					
MC- 71	Mercury barometer (fortin type)	Measurement of barometric pressure	1						1		
MC- 72	Oxygen-acetulene welding kit	Gas welding and cutting of metals	2			2					
MC- 73	Bench drill machine	Piercing of small metals	3			1		2			
MC- 74	Height gage	Measurement of precise height of parts	1					1			
MC- 75	Fan coil unit	Study of structure and capacity of fan coil unit	1								1
MC- 76	Battery charger	Study of structure and capacity of batteries	1		1						
MC- 77	Sine bar	Measurement of angle precision parts	3			1		2			
MC- 78	Green hardness tester "B" scale	Measurement of propriety of hardness for molding sand	1			1					
MC- 79	Gasoline engine (cut-away)	Study of engine structure	1		1						
MC- 80	Gas analyzer, orsat-lunge	Gas component analysis	1				1				
MC- 81	Oil rotary vacuum pump	Reloading of refrigerant	1								1
MC- 82	Refrigerant cylinder	Reloading of refrigerant	1								1
MC- 83	Oxygen tank with cart	Storing vessel for oxygen	2			2					
MC- 84	Acetylene tank with cart	Storing vessel for acetylene gas	2			2					
MC- 85	Chain block with rail	Lifting of heavy materials	3					3			
MC- 86	Hygrothermograph	Simultanous measurement of temperature and humidity	2						1	1	
MC- 87	Carter type carburetor (cut-away)	Study of structure of carburettor	1		1						
MC- 88	Weber type carburetor (cut-away)	Study of structure of carburettor	1		1						
MC- 89	Zenith type carburetor (cut-away)	Study of structure of carburettor	1		1						

Equipment List : Mechanical Engineering

ITEM	DESCRIPTION	Purpose	Q'ty	Lab. (MC-)							
				A	B	C	D	E	F	G	H
MC- 90	Standard hydrometer	Measurement of relative density	2							2	
MC- 91	Jordan's sunsine recorder	Measurement of sunlight	1								1
MC- 92	Micro caliper	Precise measurement of size	4					4			
MC- 93	Mechanical vice	Faxatin of workpieces	10	4	2	2		4			1
MC- 94	Angle grinoer	Grinding	1			1					
MC- 95	Anvil	Floor for heat processing	2					2			
MC- 96	Digital tachometer	Measurement of rotational frequency	2		1		1				
MC- 97	Micrometer	Precise measurement of size	6	2				4			
MC- 98	Electirc hand drill	Piercing	4			2		2			
MC- 99	Universal bevel protrator	Measurement of angle of precision parts	4					4			
MC-100	Guge manifold	Reloading of refrigerant	1								1
MC-101	Digimatic	Precise measurement of size	6	2		2		2			
MC-102	Depth gage	Precise measurement of depth of size	4			2		2			
MC-103	Air spray gun	Spraying of coating	1					1			
MC-104	Vernier	Precise measurement of size	16	4		4		8			
MC-105	Planimeter	Measurement of square measure	4	4							
MC-106	Dial indicator	Precise examination of machines and workpieces	18	4	2	2	2	8			
MC-107	Steel rule	Measurement of size	16	4		4		8			
MC-108	Tool box with assorted tools	Meintenance of equipment	14	1	2	1	2	4	1	1	2
MC-109	Steel cabinet		16	2	2	2	2	2	2	2	2
MC-110	Steel rack		20	4	4	2	2	2	2	2	2
MC-111a	Work table		16	4	2		2		4	2	2
MC-111b	Work table		3			1	2				
MC-112	Work bench		2		2						

Equipment List : Industrial Engineering

ITEM	DESCRIPTION	Purpose	Q'ty	Lab. (IN-)		
				A	B	C
IN- 1	Color offset printing machine set	Preparing teaching materials and school prints	1		1	
IN- 2	136 mm camera set	Commercial camera	1			1
IN- 3	Process camera set	Photographing of block copy for printing	1		1	
IN- 4	35 mm camera set	Making a record of practical training work	1			1
IN- 5	Color photo enlarger	Development work of 35mm film	1			1
IN- 6	Contact screen	Preparing net points of block copy, inspection film	1		1	
IN- 7	Development tank	Development tank for 35mm film	1			1
IN- 8	Bata video camera set	Videotape recording of practical work (Bata system)	1	1		
IN- 9	Color TV monitor 37"	Recording monitor TV	1	1		
IN- 10	Teloper	Telopping	1			1
IN- 11	Air brush set	Cleaning of dust from apparatus and materials by air spraying	1		1	
IN- 12	Video lighting set	Illumination equipments for video recording (portable)	1	1		
IN- 13	Light table	Inspection table for printing block copy	1		1	
IN- 14	Carving tools	Electric chisel	4		4	
IN- 15	Color TV monitor 4"	Recording monitor TV	2	2		
IN- 16	Light meter	Measurement of illumination	1	1		
IN- 17	Multi-timer	Measurement of time of practical training	4	4		
IN- 18	Development trays	Development tray for 35mm film	1			1
IN- 19	Negative Viewer	35mm film inspection	1			1
IN- 20	1/100 Decimal munite stopwatch	Measurement of time of practical training	24	24		
IN- 21	Digital stopwatch	Measurement of time of practical training	24	24		
IN- 22	Film change box	Curing bag for 35mm film exchange	2			2
IN- 23	Tool set	Maintenance work tools	6	2	2	2
IN- 24	Steel cabinet		6	2	2	2
IN- 25	Steel rack		7	2	3	2
IN- 26	Work table		6	2	2	2

Equipment List : Electrical Engineering

(1/2)

Item	Description	Purpos	Q'ty	Lab.(EL-)				
				A	B	C	D	E
EL- 1	Transmission/Distribution Trainer	Theory study of transmisson and wiring lines	1				1	
EL- 2	Synchronous Machine	Study of synchronous electric motor	1				1	
EL- 3	Power Pack	Large size power supply for direct current generator	1				1	
EL- 4	Squirrel Cage Induction Motor	Study of generator theory	1				1	
EL- 5	Transformer Trainer Module	Study of transformer theory	1				1	
EL- 6	DC M/G(Series/Compound)	Study of serries theory	1				1	
EL- 7	DC M/G(Shunt/Shunt)	Study of shunt generator	1				1	
EL- 8	Repulsion Motor	Study of generator theory	1				1	
EL- 9	Sequential Control Trainer	Study of sequence control	2			2		
EL- 10	Q Meter	Measurement of high frequency wave	1		1			
EL- 11	Servo Trainer	Study of servo control	1			1		
EL- 12	Winding Machine	Practice training of coil winding	1					1
EL- 13	LCR Meter	Measurement of reactance	1		1			
EL- 14	Induction Regulator	Reguration of alternating current voltage	2				2	
EL- 15	Potentiometer	Measurement of voltage	2	2				
EL- 16	Feedback Control Trainer	Study of reset control theory	2			2		
EL- 17	X-Y Recorder	Recording of secondary data	2		2			
EL- 18	Oscilloscope(Storage Type)	Observation of wave form of electric circuit (wave form retaining type)	2		2			
EL- 19	Load Resister	Non-reactive load of experimental electric circuit	4				4	
EL- 20	Load Reactor	Inductive load of experimental electric circuit	1				1	
EL- 21	Load Capacitor	Volumetric load of experimental electric circuit	1				1	
EL- 22	Starting Rheostat	Starter of direct current generator	4				4	
EL- 23	Function Generator	Signal source of experimental electric circuit	4		4			
EL- 24	Universal Counter	Measurement of frequency	6		4	2		
EL- 25	Bridge(AC)	Measurement of reactance	4		4			
EL- 26	Oscilloscope(Dual Trace)	Observation of wave form of electric circuit	10		4	4	2	
EL- 27	Bridge(Wheatstone)	Study of resistance theory	4	4				
EL- 28a	Insulation Tester	Measurement of insulation resistance (generation type)	1				1	
EL- 28b	Insulation Tester	Measurement of insulation resistance (generation type)	2				1	1
EL- 29	Variable Resistor 4 Dials	Circuitry	2	2				

Equipment List : Electrical Engineering

Item	Description	Purpos	Q'ty	Lab.(EL-)				
				A	B	C	D	E
EL- 30	Wattmeter	Measurement of alternating electric power	20				16	4
EL- 31	Audio Generator	Signal source of experimental electric circuit	8		8			
EL- 32	Digital Clamp-on Meter	Measurement of electric current in wires	1				1	
EL- 33	Power Factor Meter	Measurement of power factor	2				2	
EL- 34	Synchronizing Device	Measurement of voltage phase of two lines	1				1	
EL- 35	Multitester(Digital)	Measurement of voltage and current	22	8	8	2	2	2
EL- 36	Parallel-plate Capacitor	Study of capacity	1		1			
EL- 37	Star Delta Switch	Wiring system conversion of three phase alternating electric source	1				1	
EL- 38	Reversing Switch	Phase conversion of three phase alternating electric source	1				1	
EL- 39	Earth Tester	Measurement of insulation resistance (battery type)	2				1	1
EL- 40	Field Rheostat	Control of direct current motor and generator	4				4	
EL- 41	Tachometer	Measurement of rotation speed of motor	7		1	2	4	
EL- 42	Regulated DC Power Supply(Variable)	Electric source of experimental electric circuit	8		8			
EL- 43	Dual Coil	Study of magnetic induction phenomenon	8		8			
EL- 44	Electronic Voltmeter	Measurement of voltage	8		8			
EL- 45	Regulated DC Power Supply(Variable)	Electric source of experimental electric circuit	10		8		2	
EL- 46	Galvanometer	Detection of minute voltage and current	2	2				
EL- 47	Voltmeter DC	Measurement of direct current voltage	56	24		8	24	
EL- 48	Ammeter DC	Measurement of direct current	72	48			24	
EL- 49	Voltmeter AC	Measurement of alternating current voltage	80	8	24		48	
EL- 50	Ammeter AC	Measurement of alternating current	80	8	24		48	
EL- 51	Phase Sequence Indicator	Phase determination of three-phase alternating electric source	1				1	
EL- 52	Multitester(Analog)	Trouble-shooting of electric circuits	24	8	4	2	2	8
EL- 53	Volt Slider	Continuous transformation of alternating voltage	8			8		
EL- 54	NFB	Protection of electric machinery	8				8	
EL- 55	Teaching Material	Teaching materials such as transistor	1式					
EL- 56	Tool Set	Practical training of production and repair	12	1	1	1	1	8
EL- 57			9	2	2	2	2	1
EL- 58			12	2	2	2	2	4
EL- 59			20	4	4	4	4	4

Equipment List : Electronics & Communication Engineering

Item	Description	Purpos	Q'ty	Lab. (ER-)			
				A	B	C	D
ER- 1	FFT Analyzer	Frequency analysis of electric phenomenon	1			1	
ER- 2	Spectrum Analyzer	Frequency analysis of electric phenomenon	1		1		
ER- 3	Microwave Trainer	Study of micro wave	1			1	
ER- 4	Color TV Trainer	Study of color-TV receiver	2			2	
ER- 5	AM/FM MOD./DEMOD Trainer	Study of AM/FM modulation circuit	1		1		
ER- 6	AD/DA Converter	Study of analogue/digital conversion	1			1	
ER- 7	Antenna	Study of antenna	1			1	
ER- 8	Vector Scope	Measurement of color-TV signals	1			1	
ER- 9	Oscilloscope(Storage Type)	Wave form observation of electric circuit (wave form retaining type)	1			1	
ER-10	Band Pass Filter(Variable)	Circuitry	1			1	
ER-11	Field Strength Meter	Measurement of electric wave strength	1		1		
ER-12	Sound Level Meter	Measurement of noise	1	1			
ER-13	Sweep Generator(FM/VHF)	Adjustment of TV/FM receiver	2			2	
ER-14	Sweep Generator(LW/MW/SW)	Adjustment of radio receiver	2			2	
ER-15	Audio Analyzer	Character analysis of audiovisual apparatus	2		2		
ER-16	Function Generator	Signal source of experimental electric circuit	11	8	2	1	
ER-17	Electronic Circuit Trainer	Study of electron circuit	2		2		
ER-18	Pulse Circuit Trainer	Pulse circuit	4	4			
ER-19	Standard Signal Generator(AM/FM)	Signal source of experimental electric circuit	4		2	2	
ER-20	Universal Counter	Measurement of frequency	2			2	
ER-21	Electronic Voltmeter(10MHz)	Measurement of voltage	12		8	4	
ER-22	Electronic Voltmeter(1GHz)	Measurement of voltage	4			4	
ER-23	Universal Counter	Measurement of frequency	4		4		
ER-24	Oscilloscope(Dual Trace)	Wave form observation of electric circuit	26	8	8	8	2
ER-25	Pattern Generator	Supply of reguration signals of TV-recievers	2			2	
ER-26	Volt Slider	Continuous transformation of alternating voltage	2		2		
ER-27	Audio Generator	Signal source of experimental electric circuit	8		4	4	
ER-28	AM Radio Trainer	Study of AM receiver	2			2	
ER-29	Transistor Checker	Check of transistor quality	3	1			2
ER-30	Semiconductor Trainer	Study of semiconductor apparatus	8	8			

Equipment List : Electronics & Communication Engineering

(2/2)

Item	Description	Purpos	Q'ty	Lab. (ER-)			
				A	B	C	D
ER-31	Multitester(Digital)	Measurement of voltage and current	18	8	4	4	2
ER-32	Electronic Voltmeter(1MHz,2Ch)	Measurement of voltage	10	8	2		
ER-33	Regulated DC Power Supply(±20V,~6	Electric source of experimental electric circuit	10	8		2	
ER-34	Attenuator	Circuitry	4		2	2	
ER-35	Illuminance Meter	Measurement of illumination	1	1			
ER-36	Regulated DC Power Supply(~35V)	Electric source of experimental electric circuit	10	8		2	
ER-37	Regulated DC Power Supply(~18V)	Electric source of experimental electric circuit	8		4	4	
ER-38	Slide Rheostat	Circuitry	2		2		
ER-39	Ammeter DC(30~3000μA)	Measurement of direct current	56	48	8		
ER-40	Voltmeter DC(0.3~30V)	Measurement of direct current voltage	32	24	8		
ER-41	Thermoprobe	Measurement of temperature	1			1	
ER-42	Multitester(Analog)	Trouble-shooting of electric circuit	18	4	4	2	8
ER-43	High Voltage Probe	Measurement of high voltage	2			2	
ER-44	Teaching Material	Teaching materials such as transistor	1式				
ER-45	Tool Set	Practical training of production and repair	11	1	1	1	8
ER-46			7	2	2	2	1
ER-47			10	2	2	2	4
ER-48			16	4	4	4	4

Equipment List : Architecture

Item	Description	Purpose	Q'ty	Lab. (AT-)							
				A	B	C	D	E1	E1	F1	F2
AT- 1	Bleu printing copier	Making blue print drawings	1					1			
AT- 2	Spectrometer	Measurement of dispersion of visible radiation and obserbation of spectrum	1			1					
AT- 3	Heliodon	Projection apparatus of equator, zodiac, weridian, and consetellations	1			1					
AT- 4	Uniform velocity axial fan	Measurement of wind capacity of pressure fan	1				1				
AT- 5	Air brush	Cleanong of dust by air spraying	1	1							
AT- 6	Daylight factor units	Illumination apparatus for various optical experiments	2		1	1					
AT- 7	Optical bench	Measurement of luminosity and focal distance of lens	2		1	1					
AT- 8	Spotlight with tripod	Illunination apparatus	1			1					
AT- 9	Drawing table set	Drawing table and chairs	192					48	48	48	48
AT-10	Track type drafting machine set	Drawing rail draft	96							48	48
AT-11	Globe thermometer	Measurement of underground temperature	2		1		1				
AT-12	Pantograph	Enlargement and contraction of floor plans	4				4				
AT-13	Sky dome	Projection setting dome of astronomical projectors	1			1					
AT-14	Psychometer	Barometer with recorder	1		1						
AT-15	Rain gauge	Measurement of precipitation	1		1						
AT-16	Kata thermometer	Thermometer with recorder	2		1		1				
AT-17	Parallel rules drafting set	Parallel scale set for drawing	96					48	48		
AT-18	Drafting instrument for archtecture drawing	Architecture drawing gadgets	96					48	48		
AT-19	Drafting instrument for mechanical drawing	Machinery drawing gadgets	96							48	48
AT-20	Ammeter	Measurement of electric current	2	1		1					
AT-21	Sound pressure meter	Measurement of wave length and frequency of sound made by tuning fork	2	1			1				
AT-22	Lettering instrument	Lettering on drawings	4				4				
AT-23	Voltmeter	Measurement of voltage	2	1		1					
AT-24	Calorimeter	Measurement of quantity of heat in water	1		1						
AT-25	Stopwatch	Measurement of working time	4			2	2				
AT-26	Compass	Compass for drawing	36	4	4	4	24				
AT-27	Tool set	Maintenance work tools	4	1	1	1	1				
AT-28	Steel cabinet		12	2	2	2	2	1	1	1	1
AT-29	Steel rack		8	2	2	2	2				
AT-30a	Work table		12	4	4	2	2				
AT-30b	Work table		2			1	1				
AT-31	Chair										

Equipment List : General science (Physics)

(1/3)

Item	Descrioption	Purpose	Q'ty	Lab.	
				A	B
GP- 1	Gravity experimental apparatus	Experiment of gravitational acceleration using carriage	2	1	1
GP- 2	Linear air-track	Linear movement analysis of running object without friction	2	1	1
GP- 3	Boyle's law apparatus	Gas expansion ratio experiment	8	4	4
GP- 4	Labo cart	Carriage for various purposes	2	1	1
GP- 5	Phase generator	Wave formation for wave motion experiment	2	1	1
GP- 6	Regulated DC power supply unit	Stable supply of direct current source to practical training apparatus	8	4	4
GP- 7	Steam Generator	Steam genetration	2	1	1
GP- 8	Triple beam balance	Measurement of weight	8	4	4
GP- 9	Resonance tube apparatus	Beat experiment	2	1	1
GP-10	Young's modules of wires apparatus	Experiment of modulus of elasticity in tension	8	4	4
GP-11	Spark timer	Analysis of velocity change by photographing	2	1	1
GP-12	Atwood test unit	Floor novement experiment such as parabolic movement	8	4	4
GP-13	Power supply	Supply of electric source to practical training apparatus	8	4	4
GP-14	Magnetic field observation box	Practical training of distribution and external interference of magnetic field	8	4	4
GP-15	Calvanometer for demonstration	Measurement of minute electric current and voltage for experiment	2	1	1
GP-16	Measuring tool	Various measurements	8	4	4
GP-17	Dynamics bench	Study of dynamic energy conservation by pendulum	8	4	4
GP-18	Falling-body acceleration apparatus	Experiment for free fall and horizontal projection	8	4	4
GP-19	Torricell's demonstration apparatus	Measurement of existence and strength of atmospheric pressure by vacuum obsevation	2	1	1
GP-20	Wave motion demonstration apparatus	Wave transmission experiment with the medium of spring	2	1	1
GP-21	Inertia moment experiment apparatus	Study of the third kinetic law	8	4	4
GP-22	Sonometer	Study of relationship between sound height and strength and chord condition	8	4	4
GP-23	Lecture balance	Measurement of weight	2	1	1
GP-24	Micro mesuring tool	Minute measurement (direct sight)	8	4	4
GP-25	Double boiler	Heating sample experiment	8	4	4

Equipment List : General science (Physics)

(2/3)

Item	Descrioption	Purpose	Q'ty	Lab.	
				A	B
GP-26	Projector ripple tank	Wave movement observation of fluid surface	2	1	1
GP-27	Parabola movement apparatus	Study of radiation movement	8	4	4
GP-28	Resistance demonstration	Study of electric resistance	16	8	8
GP-29	Collision test apparatus	Study of momentum preservation law	16	8	8
GP-30	Slide rheostat	Optical setting of resistance value	16	8	8
GP-31	Thermometer		16	8	8
GP-32	Inclined plane	Experiment of balancing and component of force	8	4	4
GP-33	Dynamics cart apparatus	Experiment of balancing, component of force, sliding, rolling friction	8	4	4
GP-34	Pressure gauge	Measurement of pressure	16	8	8
GP-35	Dynamics cart	Basic experiment of kinetic energy	8	4	4
GP-36	Balls	Fall experiment	8	4	4
GP-37	Electrostatic field apparatus	Theory study of static electricity	8	4	4
GP-38	Eletro magnet	Electromagnet for experiment (Study of structure and theory)	2	1	1
GP-39	Galvanometer	Measurement of minute electric current and voltage	8	4	4
GP-40	Table balance	Measurement of weight	8	4	4
GP-41	AC voltmeter	Measurement of alternating current voltage	8	4	4
GP-42	DC voltmeter	Measurement of direct current voltage	8	4	4
GP-43	AC ammeter	Measurement of alternating current	8	4	4
GP-44	DC ammeter	Measurement of direct current	8	4	4
GP-45	Calorimeter	Experiment of calorie measurement	8	4	4
GP-46	Assorted weight	Dynamic experiment	16	8	8
GP-47	Friction experimental apparatus	Quantitative experiment of the largest static friction and sliding friction	8	4	4
GP-48	Optical equipment	Experiment of basic optics (reflection, refraction, mirror principle, etc)	8	4	4
GP-49	Stopwach	Measurement of time	16	8	8
GP-50	Circuit tester	Test of electric current in the circuit	8	4	4

Equipment List : General science (Physics)

(3/3)

Item	Descrioption	Purpose	Q'ty	Lab.	
				A	B
GP-51	Rule		16	8	8
GP-52	Pully	Dynamic experiments using various apparatus	16	8	8
GP-53	Gas expansion apparatus	Half-quantitative examination of Boyle-Charles' law	8	4	4
GP-54	Magnetic field apparatus	Stereoscopic observation of magnetic field	8	4	4
GP-55	Magnet set	Study of magnetism and magnetic field	48	24	24
GP-56	Tape measure	Measurement of length	48	24	24
GP-57	Hook's law experiment unit	Experiment of strain	8	4	4
GP-58	Divider		16	8	8
GP-59	Spring balance	Measurement of weight	16	8	8
GP-60	Laboware		2式		
GP-61	Steel cabinet		4	2	2
GP-62	Strage rack		8	4	4
GP-63	Laboratory table		8	4	4
GP-64	Table for teacher		2		

Equipment List : General science (Chemistry)

(1/2)

Item	Description	Purpose	Q'ty	Lab.	
				A	B
GC- 1	Water distillation apparatus	Production of distilled water for experiment	1	1	
GC- 2	Electronic analytical balance	Precise measurement of weight	2	1	1
GC- 3	Electric conductivity meter	Measurement of conductivity	4	2	2
GC- 4	Constant temperature water bath	Insulation and heating of sample solution (side perspective type)	2	1	1
GC- 5	Constant temperature oven	Drying of samples and apparatus	2	1	1
GC- 6	Melting point tester	Measurement of melting-point of substance	2	1	1
GC- 7	Analytical precision balance	Precise measurement of weight	4	2	2
GC- 8	pH meter	Measurement of pH of solution	8	4	4
GC- 9	Electronic top-pan balance	Precise measurement of weight	8	4	4
GC-10	Aspirator	Aspirator for suction	4	2	2
GC-11	Calorimeter	Measurement of quantity of heat and specific heat	4	2	2
GC-12	Hot plate	Insulation and heating of sample solution	8	4	4
GC-13	Oswald viscometer	Measurement of viscosity using U-Tube	4	2	2
GC-14	Thermostat	Automatic control of temperature	4	2	2
GC-15	Reflex apparatus	Reaction by reflux	4	2	2
GC-16	Triple beam balance	Measurement of weight	4	2	2
GC-17	Mantle heater	Medium-temperature heating	16	8	8
GC-18	Dessicator	Drying of samples	4	2	2
GC-19	Stopwatch	Measurement of time	16	8	8
GC-20	Digital multitester	Measurement of voltage and potential difference	8	4	4

Equipment List : General science (Chemistry)

(2/2)

Item	Description	Purpose	Q'ty	Lab.	
				A	B
GC-21	Phonometer	Measurement of relative dencity of liquids	16	8	8
GC-22	Bar magnet	Magnetic reaction of solution	8	4	4
GC-23	Glass for DUMAS' method of vapor-density	Measurement of molecular weight of gas based on its density	16	8	8
GC-24	Max / min thermometer	Measurement of highest and lowest temperature	16	8	8
GC-25	Thermo meter	Measurement of temperature	32	16	16
GC-26	Water bath	Insulation and heating of sample solution	16	8	8
GC-27	Laboware		1 式		
GC-28	Glassware		1 式		
GC-29	Chemicals		1 式		
GC-30	Steel cabinet		8	4	4
GC-31	Steel rack		8	4	4
GC-32	Laboratory table		8	4	4
GC-33	Table for teacher		2		

Equipment List : Supplemental Educational Equipment

Item	Description	Purpose	Q'ty	Lab. (SP-)			
				A	B	C	Com.
SP- 1	VTR tape for education	Various tapes for lectures	1set				1
SP- 2	Copying machine	Making copies of teaching and testing materials	3			1	2
SP- 3	Video projector set	Film projection for lectures and meeting materials	1	1			
SP- 4	Video screen	Film projection screen	1	1			
SP- 5	Mimeographing machine	Printing of teaching and testing materials	2			1	1
SP- 6	16 mm Film projector	Film projection for lectures and meeting	1	1			
SP- 7	Word processer	Preparation of materials for lectures and meeting	2				2
SP- 8	Sounding System	Sound apparatus for lectures and meeting	1set	1			
SP- 9	Video console	Picture handling table	1	1			
SP-10	Video presentation stand	Display table with monitor e	1	1			
SP-11	Opaque projector	Projection of lecture materials	1		1		
SP-12	Facsimile machine	Transmisson of documents	1			1	
SP-13	Betamax video cassete	Projection of lecture and meeting materials (1/2 tape system)	1	1			
SP-14	OHP set	Projection of lecture film	5	1	4		
SP-15	Slide projector	Projection of lecture film	2		2		
SP-16	VHS video cassette tape recorder	Projection of lecture and meeting materials (1/2 tape system)	1	1			
SP-17	Video monitor	Visual monitor TV	2	1	1		
SP-18	Punch with two holes	Filing of documents	4				4
SP-19	Paper cutter	Cutting of documents	2			2	
SP-20	Screen	Projection screen	1	1			
SP-21	White board	Lectures and meetings	10				10
SP-22	Cork board	Display of materials and infomation	8				8
SP-23	Stapler	Filing documents	14			4	10
SP-24	Steel cabinet		4				4
SP-25	Steel rack		4				4

5. IMPLEMENTATION PLAN OF THE PROJECT

5. IMPLEMENTATION PLAN OF THE PROJECT

5.1 Organization for Implementation of the Project

The implementation of the Project will be executed by the Administration and Finance Department in PUP.

After the Exchange of Notes is concluded between the Governments of Japan and the Philippines, contract is made to be carried out with the Government of the Philippines by a Japanese consultant firm on the detailed designs and supervision, and by a Japanese trading firm on the supply and installation work of the equipment.

5.2 Undertakings of Both Governments

The project is planned to provide educational equipment keeping up with the construction plan of a new CEA building in the Philippine side. Undertakings of both governments for the Project are shown in the Table 5.1.

TABLE 5.1 UNDERTAKINGS OF BOTH GOVERNMENTS

Work Items	Japan	Philippines
(1) Equipment		
1) To procure the equipment	0	
2) Installation of the equipment	0	
3) Test run	0	
4) Orientation in the Philippines	0	
(2) Electrical works		
1) Distributing line to the distribution panel and terminal		0
2) Wiring between each equipment	0	
(3) Water supply and drainage works		0
(4) To secure the space to store the equipment		0
(5) To provide utilities		0
(6) To ensure import/custom clearance		
1) Transportation to Philippines	0	
2) Tax exemption/custom clearance		0
3) Internal transportation in Philippines (from the Port to the Site)	0	
(7) To bear the commissions to Japanese foreign exchange bank for banking services based on the B/A (Banking Arrangement)		0
(8) To accord convenient official services for Japanese nationals whose work may be required in connection with the Project at their entry into and departure from the Philippines and during their stay therein for the performance of their work		0
(9) To maintain and use properly and effectively the equipment provided by the Grant-in-Aid		0
(10) To bear all expenses other than those to be borne by the Grant-in-Aid necessary for the construction of facilities as well as for the transportation and installation of the equipment		0
(11) Procedures to get approvals necessary for the works, etc.		0

5.3 Execution Plan

5.3.1 Execution Principle Items to be Considered

Considering this project is carried out through the grant aid provided by the Government of Japan, the following items should be taken into account in the execution of this Project.

(1) Coordination between the construction work performed by the Philippines side and the installation work of the equipment.

(2) Clarification of the allotment in the utility works such as electricity, water supply and drainage, gas, etc. to carry out the execution smoothly and effectively.

(3) Keeping good relationship between the Philippines side and the consultant and contractor of Japan side through the sufficient discussion to exchange opinions.

(4) Prevention of accidents while temporary storing, delivery and installation.

(5) Timely installation based on the good communication between both sides as for the large-size machine tools and experiment equipments. The installation work is performed in the last stage of the construction work by the Philippines side.

5.3.2 Execution Supervision Plan

In the execution supervision of this Project, a careful supervision plan will be formulated based on the sufficient preliminary arrangements with the Philippines side. The following items should be taken into account on the execution supervision.

(1) Detailed coordination will be made with PUP from the designing stage in order to install the equipment smoothly. Especially, it is necessary to exchange enough information for the construction work to

meet the requirements of the installation, and to confirm the contents and schedule of construction and facilities works according to the progress of the construction work.

(2) Prior to the installation, the execution plans submitted by the contractor concerned will be fully reviewed, and the propriety of the work schedule, procurement plan and specifications will be examined.

(3) Factory inspection of the equipment will be made in Japan to enable the smooth delivery and installation.

(4) As for the delivery and handing over of the equipment, it will be confirmed whether the specifications meet the design requirements, and the instructions of installation work and the methods of usage are appropriate.

5.3.3 Coordination with the Building Construction Plan

In the execution stage of the construction plan of the Philippines side, an execution plan of installation of the equipment will be formulated after the sufficient preliminary arrangements, and coordination will be made based on the plan. The following items should be taken into account on the coordination.

(1) Coordination between the construction work performed by the Philippines side and the installation work of the equipment.

(2) Prevention of delays based on the comprehension of the progress of undertakings by the Philippines side.

(3) Close contact with PUP and the Contractor and sufficient preliminary arrangements to proceed successful execution.

As the construction work of the new CEA building is executed by the Philippines side, it is necessary to promote careful communication with the Philippines side in providing the equipment which require installation work. For example, it is essential to complete the construction work exactly as specified for the installation of the equipment such as large-

size machines installed on the foundation and experiment tables that need electricity, water supply and gas utilities. For some of large-size experimental machines and machine tools for the Departments of Civil Engineering and Mechanical Engineering, it is also necessary to start installation work during the construction work.

Therefore, the progress and contents of the construction work by the Philippines side are to be monitored and be coordinated with the installation works of the equipment.

5.4 Implementation Schedule

The following is the implementation schedule of this Project (Table 5.2). It is divided into three stages of designing, tendering and execution. In the execution stage, it is necessary to work for sufficient coordination with the building construction schedule.

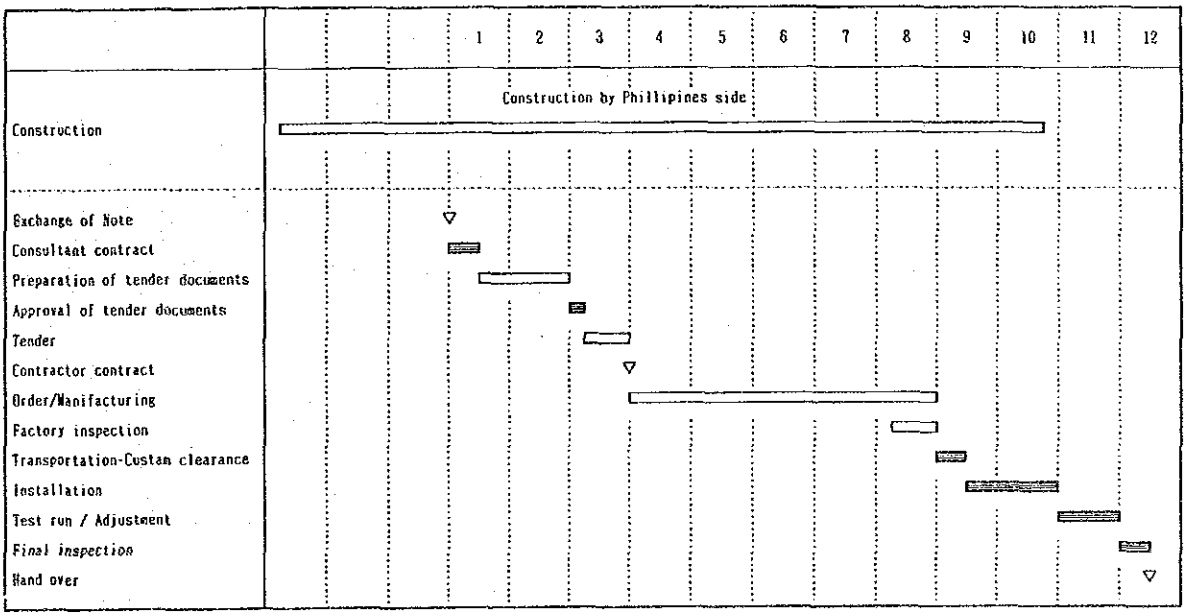

FIG. 5.1 IMPLEMENTATION SCHEDULE

5.5 Portion of the Project Cost of the Government of the Philippines

The portion of the supply and installation cost to be borne by the Government of the Philippines is none. The works undertaken by the Philippine side for the Project is the facilities work in the construction plan of the new CEA building. The construction cost of the new CEA school building is estimated at about 96 million peso.

6. OPERATION AND MAINTENANCE PLAN

6. OPERATION AND MAINTENANCE PLAN

6.1 Operation System

CEA belongs to the educational sector of PUP with the same status as the other nine Colleges. It is planned that the whole college will be composed of 7 existing Departments and 4 newly established Departments in 1991, totaling 11 Departments. The organization of CEA consists of laboratories of each Department, College administration office, operation and maintenance section of facilities and equipments under the dean. The present faculty is 136 including 125 full-time instructors and 11 transferred ones from other Colleges. The fact is that every instructor is in charge of extra classes to make up the shortage of about 20 instructors.

The laboratories of each Departments are involved in all the educational activities in the College such as preparation of curriculum, teaching materials, instructions of experiments and training, lectures, etc. Effective use of the supplied equipment require smooth operation of the organization and the educational activities by the faculty of each Department. Therefore CEA has been trying to improve the faculty and reorganize the whole College, clarifying the assigned tasks and preparing for the future expansion.

In 1996-97 when full-scale educational programs start, more than 300 educational staff will be needed. It is expected that these staff will perform effective educational activities using the supplied equipment.

6.2 Maintenance System

At present the Operation and Building/Equipment Maintenance Division in the Administration Section of Administration and Finance Sector is in charge of the operation and maintenance of the whole buildings and equipments in PUP. Outdoor facilities including ground and parking areas, warehouse, and cafeteria are managed by other Divisions.

As most of the Colleges are located in the same place in the principal building, the above mentioned Building/Equipment Maintenance Division has been in charge of the operation and maintenance of the buildings and equipment of all the colleges of PUP. It is planned that other Colleges will have its own independent building as CEA and College

of Hotel and Restaurant Management Department whose building is under construction now. When each College becomes independent, it will be inefficient for Building/Equipment Maintenance Division to be in charge of the whole Colleges.

For these reasons, Operation and Maintenance Division will be established independently in CEA as described above to perform the operation and maintenance of the facilities and equipment thoroughly and exclusively in its own College. The division will aim at efficient operation in staff, work, materials, etc. by cooperating with Building/Equipment Maintenance Division in Administration Sector of PUP.

This Operation and Maintenance Division of CEA is planned to be established by 1991 when the new building is completed with the equipment furnished. It is composed of 5 engineers, 11 equipment operators and 5 other workers, totaling 21. The operation , maintenance and repairs of the equipment will be given and consummables will be supplied keeping in contact with the persons responsible for the equipment in each Department.

6.3 Operation and Maintenance Budget

The actual budget of PUP is shown in Table 2.6 in "2.3.4 Budget of PUP". It is disbursed as necessary expenses to each College from each item of personnel and operation expenses of the whole university.

6.3.1 CEA's Personnel Expense Plan

The personnel expenses of PUP is 121.6 million peso for actual expenditure in 1989, 149.8 million peso for 1990 budget. The request amount for 1991 when this Project is implemented is 429.4 million peso. The personnel expenses for the faculty and staff in CEA will be disbursed from this budget. Table 6.1 shows the actual record and forecast of the personnel expenses of CEA.

TABLE 6.1 PERSONNEL EXPENSES IN CEA

Unit : 1000 Peso

	1987	1988	1989	1990	1991	1992
Educational staff	1,407.6	1,545.8	2,121.1	4,905.0	5,985.0	7,976.0
Others	2,497.6	2,658.4	3,304.4	3,987.0	4,965.0	5,876.0
Total	3,905.2	4,204.2	5,425.5	8,892.0	10,852.0	13,852.0

Source: PUP budget table

CEA has full-time and part-time faculty. The part-time workers are included in the item of Others in the table. The figures up to 1989 indicate the actual record and those after 1990 show the forecast.

Assuming the total number of faculty in 1989 was 125, it is estimated the average annual salary per one person was about 430,000 peso. If the estimated average annual salary per one person in 1991, implementation year of this Project, is about 520,000 peso, the total number of staff will be about 210 based on the forecast of the personnel expenses. Thus it will be possible to secure the number of faculty enough for the proper operation.

It is estimated that the personnel expenses of Operation and Maintenance Division of CEA which is planned to be established in 1991 is 1,099,000 peso for fiscal 1991, and 1,209,000 peso for the fiscal 1992. The Table 6.2 shows the details of the expenses.

TABLE 6.2 BREAKDOWN OF PERSONNEL EXPENSE IN OPERATION AND MAINTENANCE DIVISION IN CEA

Method of Calculation	Staff of Operation Maintenance Division Technicians	Toolkeepers	Janitors	Total
No. of staff	5	11	5	21
Daily Wage	120	100	90	
x 1.25				
= Actual Wage *1	150	125	112.5	
x 26				
= Monthly Wage	3,900	3,250	2,925	
x 13				
= Annual Wage	50,700	42,250	38,025	
x No. of staff				
= Total personnel expense	253,500	464,750	190,125	908,375
Annual personnel expense in 1991 *2	306,735	562,348	230,051	1,099,134
Annual personnel expense in 1992 *2	337,409	618,582	253,056	1,209,047

*1 Actual daily wages include various allowances and overwork expenses
*2 Annual increase rate of payment is assumed to be 10 percent.
Source: PUP

6.3.2 Operation and Maintenance Cost

Various expenses necessary for operation and maintenance of equipment except personnel expenses are appropriated as the operation cost in the whole budget items of PUP. The actual expenditure in 1989 is about 38.6 million peso, budget amount is planned to be 39.3 million peso for 1990 and 80 million peso for 1991.

The operation and maintenance of the equipment in this Project is performed independently by Operation and Maintenance Division which is to be newly established in CEA. CEA has gradually expanded its scale since 1989, but it will stay in the main school building with other Colleges until 1990. Consequently, most of the lighting and heating expenses are included in those of PUP as a whole. It is estimated that the budget of operation and maintenance expenses for facilities and equipment, and lighting and heating expenses will be increased as well as the budget of

materials and consummables for the supplied equipment from the year of 1991 when the new CEA building is completed.

Table 6.3 shows the budget request for the operation expenses in CEA, and Chart 6.4 indicates the estimation of the lighting and heating expenses for the supplied equipment and the new CEA building.

TABLE 6.3 OPERATION AND MAINTENANCE COST OF CEA (1987-1992)

Items of Expenses	Actual*				Proposed*	
	1987	1988	1989	1990	1991	1992
Maintenance for Facilities & Equipment	205	225 (1.1)	453 (2.0)	593 (1.3)	1,940 (3.3)	2,700 (1.4)
Educational Materials & Consummables	312	397 (1.3)	629 (1.6)	1,163 (1.8)	2,440 (2.1)	3,500 (1.4)
Lighting & Heating	2	3 (1.5)	8 (2.7)	180 (22.5)	1,700 (9.4)	2,200 (1.3)
Others	121	196 (1.6)	456 (2.3)	320 (0.7)	740 (2.3)	990 (1.3)
Total	643	821 (1.3)	1,546 (1.9)	2,257 (1.5)	6,820 (3.0)	9,300 (1.4)

* Figures in parentheses show the multiplication ratio of the previous year.

TABLE 6.4 ESTIMATION OF ANNUAL OPERATION AND MAINTENANCE EXPENSE FOR THE NEW BUILDING AND EQUIPMENT

Items	Electricity		Water Supply		Total Cost (Peso)
	Consumption	Cost	Consumption	Cost	
New Building	147,329	405,155	17,305	107,293	512,448
Equipment*	372,127	1,023,351	6,072	37,649	1,061,000
Total	519,456	1,428,506	23,377	144,942	1,573,448

* Each figure shows the annual consumption and expenses.

1.7 million peso of 1991 budget for lighting and heating cost in CEA Budget Request seems appropriate as it has some excess margin compared with the estimated amount of about 1.57 million peso for annual lighting and heating expenses in new CEA building.

The annual maintenance expenses required for operation, maintenance and repairs of the supplied equipment is estimated to be 2,260,000 peso. To cover this expenses, the operation and maintenance expenses for facilities and equipment and the expenses for teaching materials and consummables is sufficient as it totals to 4,340,000 peso in 1991 budget.

7. EVALUATION OF THE PROJECT

7. EVALUATION OF THE PROJECT

7.1 Effects of the Project Implementation

7.1.1 Effects on PUP/CEA

PUP is a state university established and operated with a primary purpose of providing opportunities of tertiary education of technology to the rich and the poor alike. A majority of 43,600 students who are enrolled now are from the families of low income. At present, CEA, being composed of 7 Colleges, provides important educational opportunities in promoting the industrialization of the country. But the insufficient facilities and the lack of proper equipment for education and training is a big factor that has caused its limited educational activities. Thus, the number of students enrolled is limited and the educational standard has been relatively decreased.

It is expected that this project of providing educational equipment will realize the practical education with sufficient training and the technological education that CEA is aiming for. Introducing various kinds of educational equipment such as computers will promote uplifting the quality of education in the whole College as well as that of each student.

5,017 students are registered in CEA now, and it is estimated to accept 9,046 students in 1996 according to PUP's plan. When the new CEA building is completed and necessary educational equipment are installed through this Project, it will be possible to carry out the future plan so that many students will be able to get higher quality education than before. It is also anticipated that the uplifting the quality of education will stimulate other Colleges, demonstrating a good example for educational expansion, and thereby improve the whole education of PUP.

7.1.2 Effects on the Society of the Philippines

The new Aquino government emerged in 1986 has been carrying out the policies protecting the economically weak, putting an emphasis especially on "Development of education and human resources". PUP is the special university established and operated with the purpose of providing tertiary education to the young people who are not endowed with educational opportunities due to financial reasons in spite of their strong desire for

learning. It is expected that this project of providing educational equipment to CEA will enable the youth from the families of low income who wish to enter engineering departments with high educational cost to give high quality education with a small amount of school expenses, and thus contribute the accomplishment of the policy goals of the Philippines, namely the development of education and human resources.

The curriculum of CEA puts a stress on the technological education and the vocational training rather than the academic research. Many excellent engineers who are trained with the equipment supplied through this project will be produced, and thereby contribute to the modernization of the industries of the country.

Today there are 1,078 universities and colleges in the Philippines, and 176 universities and colleges including 12 state universities in NCR. It is common to all the universities that the students are not given sufficient education because of low standard of the educational equipment and the lack of experiments and training.

As a result of the effective education by CEA through experiments and training using the supplied educational equipment, this Project will appeal the significance of planning of provision of the educational equipment to each university aiming at upgrading the educational effect; and thereby contribute to uplift the level of whole industry of the Philippines.

7.2 Justification of the Project

The government expects much from the activities of PUP/CEA established on the basis of the educational ideology to provide with a small amount of school expenses high quality education to the young people from the families of low income seeking for technological studies, and thereby contribute the industrial development of the country. But the fact is that sufficient experiments and training are not given due to the financial problems in purchasing necessary equipment, although experiments and training are essential for the curriculum of the engineering and technology education.

Under these conditions, the construction project of the new CEA building has been carried out with the estimated budget of 96 million peso as one of the five-year development plan (1987-92) of PUP formulated following the policy goals of the Medium-Term Philippine Development Plan

(1987-92) of the country, namely "development of education and human resources". After the completion of the Project, it is planned to establish a operation and maintenance division in CEA where full-time staff will be in charge of the maintenance work. The organization and faculty of CEA in charge of education will also be strengthened. It is hoped that the operation of this Project will go on smoothly.

We expect that this Project will provide educational opportunities to the youth from the families of low income, and uplift the quality of education in PUP/CEA. As a result, a number of excellent engineers will be produced through the practical education making much of experiments and training; and thereby not only increase the income of the underprivileged people but also promote the industrial modernization of the Philippines.

Therefore, it are determined that the implementation of the Project in appropriate.

8. CONCLUSION AND RECOMMENDATION

8. CONCLUSION AND RECOMMENDATION

8.1 Conclusion

In the Philippines many young people are not privileged to get educational opportunities due to financial conditions in spite of their strong desire for learning. Consequently, they face the problem of the limited or no opportunities of employment which causes the social unrest. In order to solve the problem, the government of the Philippines has been carrying out the policies protecting the economically weak putting up the slogans of "development of education and human resources" as a main goal of the Medium-Term Philippine Development Plan. PUP, aiming for achieving the goals, also prepared the five-year development plan of its own, but the shortage of educational equipment has been a main constraint for the plan to be carried out.

This Project aims at improving and uplifting the quality of the education in CEA through providing necessary equipment for educational activities of PUP. As a result it will be possible to realize the educational ideology of PUP to provide high quality education to all the students including those who are from the families of low income. It is also convinced that the graduates who are highly educated and trained through this Project will greatly promote the industrial and economic development of the Philippines.

Thus, this project is expected to contribute the achievement of the goal of "development of education and human resources" formulated by the government of the Philippines and be a help to the socio-economic development of the country.

Therefore, it is assumed to be considerably significant that the Government of Japan will provide the grant aid to implement this Project.

8.2 *Recommendation*

8.2.1 Recommendation to the Philippines

It is recommended that the Government of the Philippines will take the following measures in order to carry out the effective execution of this Project and proper operation thereafter.

(1) The Government of the Philippines is responsible for proceeding the construction work of the new CEA building so that the delivery and installation of the equipment will be completed without delay.

(2) The Government of the Philippines will take the necessary procedures promptly regarding undertakings allotted to Japan side.

(3) In order to use the supplied equipment effectively, the names of the persons in charge of the operation and maintenance should be clarified, and it is necessary to keep the equipment in better condition all the time.

(4) It is necessary to prepare such curriculum as to use the equipment effectively in an adequate scale for a proper number of people so that the educational effects will be enlarged.

8.2.2 Recommendation for Technical Cooperation

the equipment supplied by the Project has been selected from those which could be effectively utilized by the Philippine side, taking into consideration the educational level of CEA, curriculum, the construction plan of the new CEA building etc. The level of education of CEA will be upgraded by utilizing the equipment. However it is recommended the technical cooperation by the Government of Japan to be carried out to achieve more effective use of the equipment.

APPENDIX

APPENDIX

Appendix 1

Appendix 2

APPENDIX 1

1.1 Members of the Basic Design Study Team

Name	Speciality (Present Position)
Masazumi KUMAGAYA	Team Leader (Associate Professor, Dept. of Electronic Engineering SENDAI National College of Technology)
Katsumi ISIHARA	Engineering Education (Professor of Applied Physics, Dept. of Mechanical Engineering GIFU National College of Technology)
Satoshi KINUGAWA	Project Coordinator (Official, Grant Aid Division, Economic Cooperation Bureau Ministry of Foreign Affairs)
Soichi TAKAI	Equipment Layout Planner (System Science Consultants, Inc.)
Yasumichi DOI	Equipment 1 (System Science Consultants, Inc.)
Hiroshi HIRAKAWA	Equipment 2 (System Science Consultants, Inc.)

1.2 Study Team Survey Itinerary

(1/2)

Date	Itinerary	Description
1. Nov.28 (Tue)	Narita-Manila	Deperture of the team. Arraival at Manila. Coutesy call to Embassy of Japan and JICA.
2. Nov.29 (Wed)	Manila	Coutesy call to PUP. Explanation of Inception & discussion.
3. Nov.30 (Thu)	Manila	Discussion with PUP on the project component
4. Dec. 1 (Fri)	Manila	Stand by at the hottel due to coup Team meeting.
5. Dec. 2 (Sut)	Manila	Stand by at the hottel. Team meeting.
6. Dec. 3 (Sun)	Manila	Stand by at hottel. Data analysis.
7. Dec. 4 (Mon)	Manila	Discussion with PUP on the project component at the hotel.
8. Dec. 5 (Tue)	Manila	Team meetind. Discussion on Minutes. Singing of minute of discussion. Visit to TUP.
9. Dec. 6 (Wed)	Manila-Narita	Deperture of official members of the team.
	Manila	Discussion with PUP
10.Dec. 7 (Thu)	Manila	Discussion with PUP.
11.Dec. 8 (Fri)	Manila	Discussion with subject in PUP.
12.Dec. 9 (Sat)	Manila	Discussion with PUP. Team meeting
13.Dec.10 (Sun)	Manila	Analysis of data and infomation.
14.Dec.11 (Mon)	Manila	Discussion in PUP.
15.Dec.12 (Tue)	Manila	Discussion with PUP ; on the new CEA building construction plan. Visit to De La Salle University
16.Dec.13 (Wed)	Manila	Visit to UP. Discussion with PUP on the questionnaire.
17.Dec.14 (Thu)	Manila	Discussion with PUP on the construction contents

Date	Itinerary	Description
18.Dec.15 (Fri)	Manila	Discussion with PUP.Report to JICA. Team meeting.
19.Dec.16 (Sat)	Manila	Confirming the Project component with PUP.
20.Dec.17 (Sun)	Manila-Narita	Deperture of the team (excluding Equipment Layout Planner)
	Manila	Data analysis
21.Dec.18 (Mon)	Manila	Discussion of equipment plan. Data collection.
22.Dec.19 (Tue)	Manila	Discussion on the construction plan. Data collection.
23.Dec.20 (Wed)	Manila	Hearing survey to DPWH & DBM. Report to JICA.
24.Dec.21 (Thu)	Manila-Narita	Deperture of Equipment layout planner

1.3 List of Members Contacted

Organization & Position	Name
☐ Embassy of Japan	
First Secretary	Kazuyosi Yamaguti
☐ JICA Philippine Office	
Vice President	Katsuhiko Ohshima
Officer	Katsuro Saito
☐ PUP	
President	Dr. Nemesio E. Prudente
Executive Vice President	Dr. Zenaida A. Olonan
Vice President, Administration & Finance	Dr. Dante G. Guevarra
Vice President, Academic Affairs & Currentry	Dr. Ofelia M. Caragues
Dean, College of CMIT	
Acting Dean, CEA	Engr. Estelita del Rosalio
Head, CEA Laboratory	Engr. Basilio R. Cruz
Charge for Special Project	Dr. Hector Morada
Chairperson, M&I. Eng'g	Engr. Froilan Gaerlan
Chairperson, E&EC. Eng'g	Engr. Federico Roy
Chairperson, Co. Eng'g	Engr. Cesar Buenavides
Chairperson, Arch.	Arch. Teodosio Mallari
Chairperson, C. Eng'g	Engr. Manuel-Melchor Bongulto
G&E. Eng'g	Engr. Jose Hipolito
Basic Physics, CAS	Prof. Lorento Pedigan
Basic Physics, CAS	Prof. Lorna Enerva
Chairperson, Ch. Eng'g	Dr. Proculo Hugo
Ch. Eng'g	Engr. Angelito Hernandes
EC. Eng'g	Engr. Elena Araojo
Director, Administrative Services	Atty. Augustus F. Cezar
Chief, Building & Equipment Maintenance	Engr. Renato M. Cano

Organization & Position	Name
☐ Technological University of the Philippines	
Deputy Head, ITRC, TUP	Mrs. Nenet C. Craza
☐ De La Salle University	
Dean, College of Engineering	Mr. Servillano Olano, Jr.
☐ University of the Philippines, Diliman	
Dean, College of Engineering	Dr. Ruben A. Garcia
☐ Department of PUBLIC Warks and Highway	
Engineer Ⅲ, Bureau of Construction	Engr. Olinar B. Mangubat
Engineer Ⅳ, Bureau of Construction	Engr. Rogelio Isturis
☐ Department of Budget and Management	
Director, Bureau of National Government Budget	Atty. Maximo D. Domingo, Jr.
☐ Rsdgutierrez Architects	
Architect	Arch. Ricardo S. Gutierrez
Architect	Arch. Graciela C. Jose

1.4 Minutes of Discussions

MINUTES OF DISCUSSION
ON
THE PROJECT FOR PROVIDING EQUIPMENT
FOR
EDUCATIONAL STRENGTHENING IN THE POLYTECHNIC UNIVERSITY OF THE PHILIPPINES COLLEGE OF ENGINEERING AND ARCHITECTURE
IN
THE REPUBLIC OF THE PHILIPPINES

In response to the request of the Government of the Republic of the Philippines, the Government of Japan decided to conduct a basic design study on the Project for Providing Equipment for Educational Strengthening in the Polytechnic University of the Philippines College of Engineering and Architecture and entrusted the study to the Japan International Cooperation Agency (JICA). JICA despatched to the Government of the Republic of the Philippines the Basic Design Study Team headed by Dr. Masazumi Kumagai, Associate Professor, Dept. of Electronic Engineering, Sendai National College of Technology, from November 28 to December 17, 1989.

The team had a series of discussions on the project with the officials concerned of the Government of the Republic of the Philippines and conducted a field survey in Manila.

As a result of the study, both parties agreed to recommend to their respective Governments that the major points of understanding reached between them, attached herewith, should be examined towards the realization of the Project.

Manila, December 5, 1989

Dr. Masazumi Kumagai
Leader
Basic Design Study Team
Japan International
Cooperation Agency (JICA)

Dr. Nemesio E. Prudente
President
Polytechnic University
of the Philippines
(PUP)

Attachment

1. Objectives of the Project

The objectives of the Project are to strengthen engineering, architecture and science education and to develop adequate manpower assisting in the industrial fields in the Philippines, through education and training of students of PUP in specific engineering skills needed in the country.

2. Executing Organization

The responsible and executing organization for the Project is the Polytechnic University of the Philippines.

3. Request of the Government of the Republic of the Philippines

The contents of the Project requested by the Government of the Republic of the Philippines are shown in Annex I. The Team will convey the request of the Government of the Republic of the Philippines to the Government of Japan that the latter will take necessary measures to cooperate by providing the equipment within the fields listed in Annex I under the scope of the Japan's Grant Aid Programme.

4. Project Site

The Project site is located at the campus of Polytechnic University of the Philippines, Sta. Mesa, Manila, shown in Annex II.

5. Undertaking of the Government of the Republic of the Philippines

The Government of the Republic of the Philippines will take necessary measures listed in Annex III on condition that the Grant Aid of the Government of Japan would be extended to the Project.

6. Understanding the Japan's Grant Aid System

The Philippine side has understood Japan's Grant Aid system explained by the Team which includes a principle of use of a Japanese Consulting Firm and a Japanese Firm for the provision of equipment.

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Annex I

The fields and major items requested by PUP are shown in the following list:

1. Computer Engineering

   a. Personal Computers
   b. Single Board Micro Computer Trainer
   c. Others

2. Civil Engineering

   a. Soil Testing Apparatus
   b. Material Testing Apparatus
   c. Others

3. Mechanical Engineering

   a. Machine Shop Equipment
   b. Transportation Experimental Equipment
   c. Thermodynamics Experimental Equipment
   d. Others

4. Industrial Engineering

   a. Managerial Analysis Equipment
   b. Others

5. Electrical Engineering

   a. Rotating Machines
   b. Fundamental Electrical Measurement Equipment
   c. Others

6. Electronics and Communication Engineering

   a. Electronic Circuit Trainer
   b. Television Trainer
   c. Others

7. Architecture

   a. Drafting Equipment
   b. Tropical Design Euipment
   c. Others

8. Chemical Engineering

   a. Fundamental Chemical Measurement Equipment
   b. Chemical Reaction Testing Equipment
   c. Others

M.K

9. Geodetic Engineering

   a. Surveying Equipment
   b. Others

10. Sanitary Engineering

   a. Sanitary Chemistry Equipment
   b. Biological Testing Equipment
   c. Others

11. Mining Engineering

   a. Sample Processing Equipment
   b. Sample Examining Equipment
   c. Others

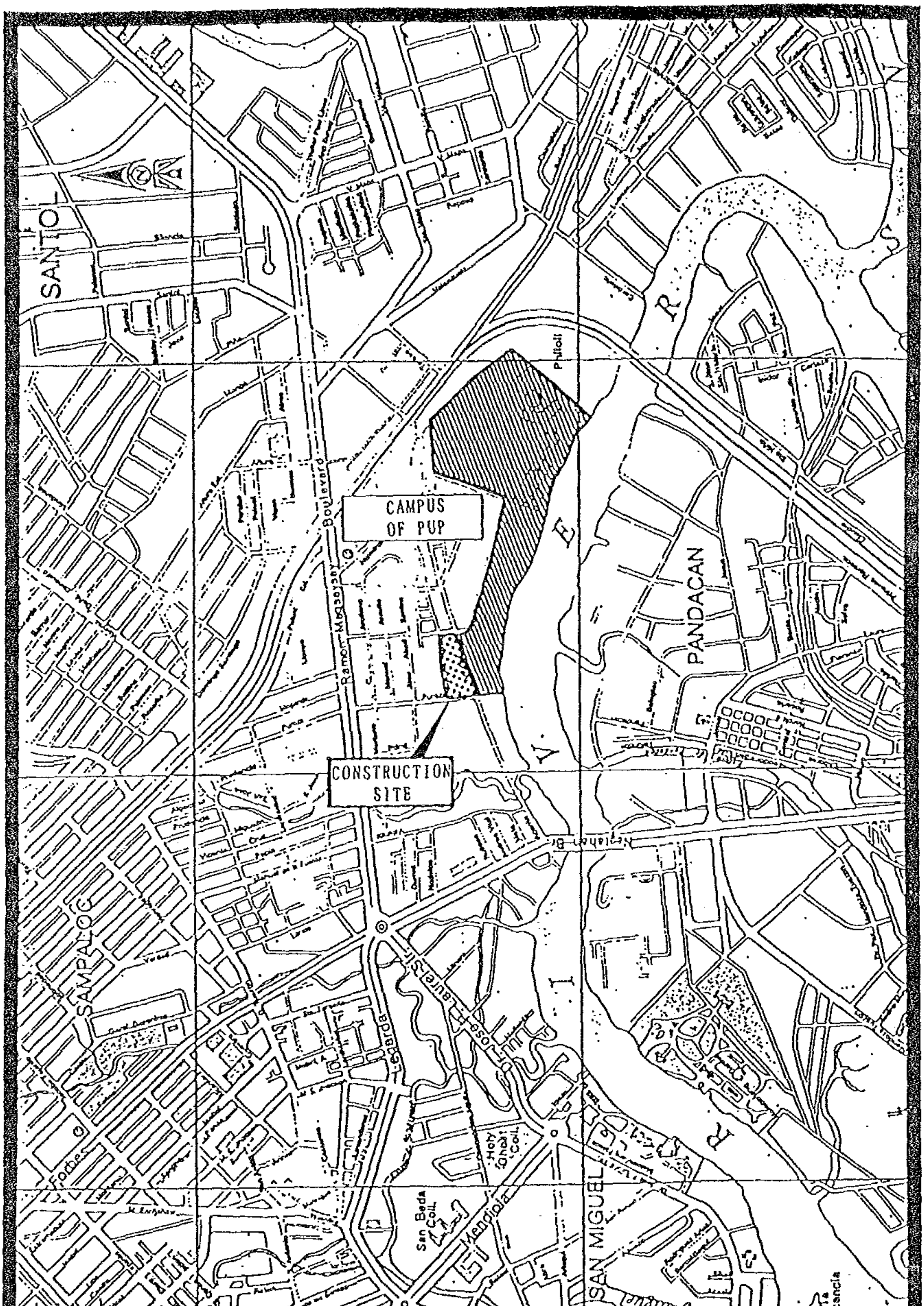
12. General Science

   a. Basic Physics Equipment
   b. Basic Chemistry Equipment
   c. Others

13. Supporting and Common Equipment

   a. Educational Supporting Equipment
   b. Audio-Visual Equipment
   c. Others

M. K


CAMPUS
OF PUP
CONSTRUCTION
SITE
SANTOL
SAMPALOC
PANDACAN
SAN MIGUEL
Ramon Magsaysay Boulevard
Legarda
Mendiola
Pasig
R
I
V
E
R
San Beda Coll
Holy Ghost Coll
Forbes

Annex III

Undertaking of the Government of the Republic of the Philippines

1. To complete the construction work of the building in which the equipment will be installed in a timely manner.

2. To provide facilities for distribution of electricity, water supply, and other incidental facilities and furniture which are required for installation of the equipment.

3. To ensure the prompt unloading and custom clearance at the port of Manila and to secure that the Japanese nationals shall not be subjected to any custom duties, internal taxes and other fiscal levies imposed in the Republic of the Philippines, with respect to the supply of materials and services under the verified contract.

4. To secure entry permits, work permits and visas as may be necessary for the entry and stay in the Philippines for Japanese nationals whose services may be required in connection with the supply of the equipment under the verified contract.

5. To maintain the use properly and effectively the equipment provided under the grant, for the execution of their works for the Project.

6. To bear all the expenses other than those to be borne by the grant, including operation and maintenance cost for the equipment and necessary expenses for the Banking Arrangement Commission.

M.K

1.5 List of References

Titol	Source	Year
☐ General • Development Plan		
Medium Term Development Plan, 1987-92	NEDA	1987
Philippine Year Book, 1987	National Statistics Office	1987
Journal of Philippine Statistics, 1989	National Statistics Office	1989
Monthly Bulletin of Statistics, 1989	National Statistics Office	1989
☐ PUP		
Socio Economic Profile of PUP, 1985-86	PUP	1985
Five Year Development Plan of PUP, 1987-92	PUP	1987
☐ Industrial Statistics		
Foreign Trade Statistics of the Phils. 1988	National Statistics Office	1989
1988 Energy Statistics	National Statistics Office	1989
☐ ASE Annual Survey of Establishments		
Manufacturing, 1986	National Statistics Office	1986
Wholesales & Retail Trade, 1986	National Statistics Office	1986
Mining & Quarrying, 1986	National Statistics Office	1986
Electricity, Gas & Water, 1986	National Statistics Office	1986
Construction, 1986	National Statistics Office	1986
☐ Population Statistics		
Vital Statistics Report, 1986	National Statistics Office	1987
1985 Family Income & Expenditures Survey I	National Statistics Office	1986
1985 Family Income & Expenditures Survey II	National Statistics Office	1986
1985 Family Income & Expenditures Survey III	National Statistics Office	1986
1985 Family Income & Expenditures Survey IV	National Statistics Office	1986
1985 Family Income & Expenditures Survey V	National Statistics Office	1986

APPENDIX 2

2.1 FOREIGN TRADE (1960 - 1988)

(F.O.B. value in million U.S. dollars)

Year	Total trade	Exports 1/			Imports			Balance of trade Favorable (+) Unfavorable (-)
		Value	Percent to total trade	Average exchange rate	Value	Percent to total trade	Average exchange rate	
1960	1,159.96	535.44	46.16	2.000	624.52	53.84	2.000	89.08 -
1965	1,630.99	795.74	48.79	3.900	835.25	51.21	3.874	39.51 -
1970	2,301.49	1,142.19	49.63	5.729	1,159.30	50.37	5.764	17.11 -
1975	5,753.65	2,294.47	39.88	7.238	3,459.18	60.12	7.230	1,164.71 -
1976	6,207.16	2,573.68	41.46	7.384	3,633.48	58.54	7.466	1,059.80 -
1977	7,065.65	3,150.89	44.59	7.346	3,914.76	55.41	7.436	763.87 -
1978	8,157.07	3,424,87	41.99	7.314	4,732.20	58.01	7.392	1,307.33 -
1979	10,742.92	4,601.19	42.83	7.323	6,141.73	57.17	7.400	1,540.54 -
1980	13,514.70	5,787.79	42.83	7.454	7,726.91	57.17	7.508	1,939.12 -
1981	13,666.08	5,720.40	41.86	7.834	7,945.68	58.14	7.856	2,225.28 -
1982	12,687.51	5,020.59	39.57	8.463	7,666.92	60.43	8.484	2,646.33 -
1983	12,491.92	5,005.29	40.07	11.125	7,486.63	59.93	11.123	2,481.34 -
1984	11,460.26	5,390.65	47.04	16.568	6,069.61	52.96	16.701	678.96 -
1985	9,739.62	4,628.95	47.52	18.538	5,110.67	52.47	18.738	481.72 -
1986	9,885.38	4,841.78	48.98	20.259	5,043.60	51.02	20.403	201.82 -
1987	12,457.21	5,720.24	45.92	20.418	6,736.97	54.08	20.631	1,016.73 -
1988	15,233.57	7,074.19	46.44	20.949	8,159.38	53.56	21.131	1,085.19 -

1/ Sum of domestic exports and re-exports.
2/ No figures available for 1895. However, figures for 1894 were close to those of 1895.

2.2 DISTRIBUTION OF SCHOOL BY SECTOR, BY LEVEL OF EDUCATION OFFERED, BY REGION (SY1985/86)

Region	Number of Schools by Offering			
	Pre-school	Elementary	Secondary	Tertiary
Philippines	2,254	33,156	5,375	1,078
Metro Manila Area(NCR)	544	697	340	176
I. Ilocos	188	2,934	633	77
II. Cagayan Valley	-	2,199	270	47
III. Central Luzon	206	2,507	456	85
IV. Southern Tagalog	412	3,948	755	131
V. Bicol	82	2,884	427	90
VI. Western Visayas	338	3,316	531	115
VII. Central Visayas	88	2,597	364	56
VIII. Eastern Visayas	75	3,209	363	60
IX. Western Mindanao	40	2,216	241	44
X. Northern Mindanao	74	2,369	378	67
XI. Southern Mindanao	42	2,236	357	84
XII. Central Mindanao	165	2,044	260	46
Government				
Philippines	1,257	31,817	3,357	293
Metro Manila Area(NCR)	202	442	119	12
I. Ilocos	127	2,833	422	20
II. Cagayan Valley	-	2,147	156	19
III. Central Luzon	91	2,371	260	23
IV. Southern Tagalog	216	3,740	474	37
V. Bicol	51	2,805	287	24
VI. Western Visayas	263	3,121	382	53
VII. Central Visayas	46	2,543	197	10
VIII. Eastern Visayas	63	3,183	289	42
IX. Western Mindanao	22	2,181	173	18
X. Northern Mindanao	20	2,305	226	17
XI. Southern Mindanao	1	2,146	202	8
XII. Central Mindanao	155	2,000	170	10
Private				
Philippines	997	1,339	2,018	785
Metro Manila Area(NCR)	342	255	221	164
I. Ilocos	61	101	211	57
II. Cagayan Valley	-	52	114	28
III. Central Luzon	115	136	196	62
IV. Southern Tagalog	196	208	281	94
V. Bicol	31	79	140	66
VI. Western Visayas	75	195	149	62
VII. Central Visayas	42	54	167	46
VIII. Eastern Visayas	12	26	74	18
IX. Western Mindanao	18	35	68	26
X. Northern Mindanao	54	64	152	50
XI. Southern Mindanao	41	90	155	76
XII. Central Mindanao	10	44	90	36

Source: Department of Education, Culture and Sports

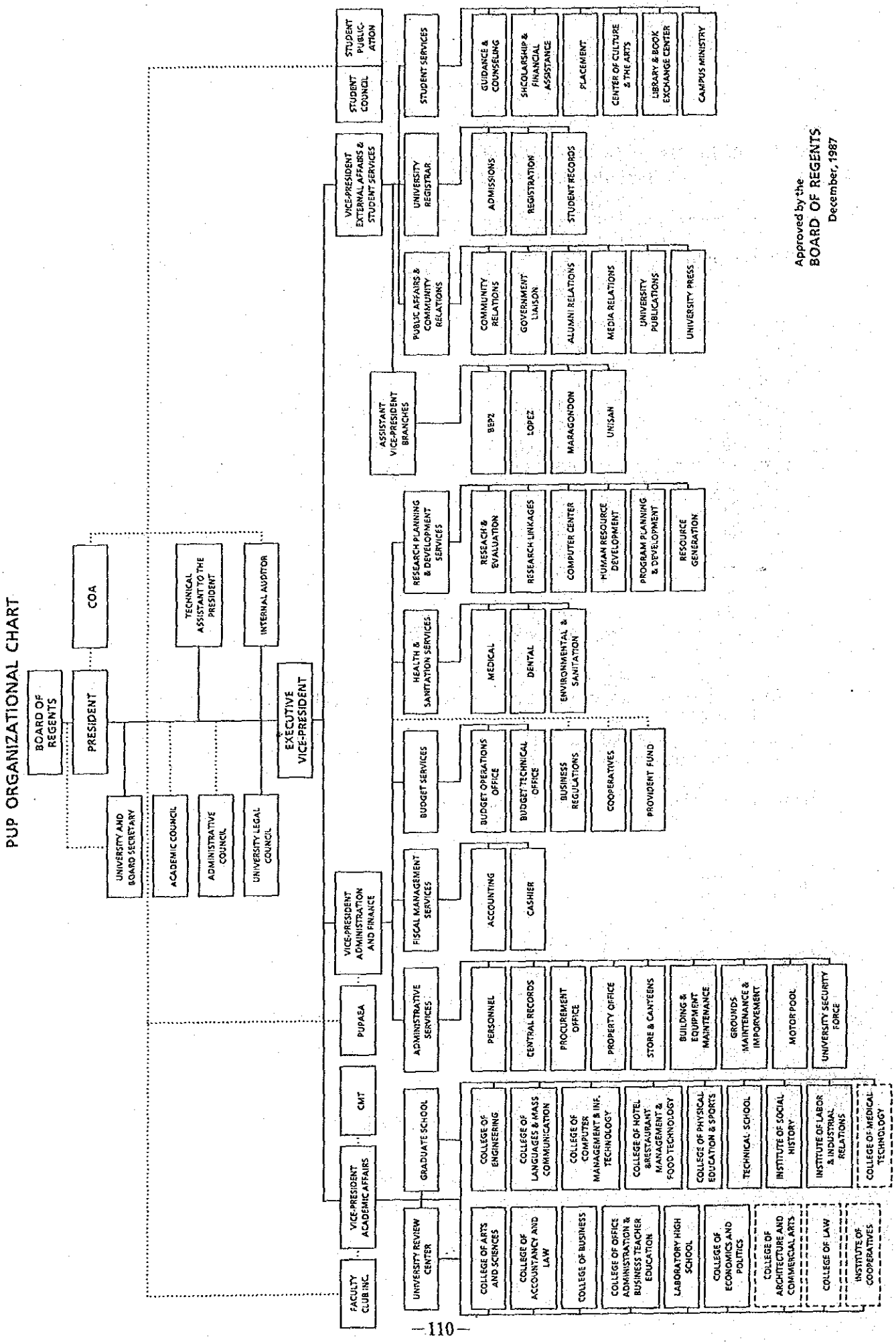
2.3 NUMBER OF SUCCESSFULL NCEE EXAMINEES (SY 1974/75 - 1986/87)

School year	Total number of examinees	Passed		Cutoff score (Percentile rank)
		Number	Percent	
Total	7,493,413	4,301,654	57.4	-
1974-75			75.0	25
1975-76	315,436	236,577	70.0	30
1976-77	390,814	273,570	70.0	30
1977-78	414,686	290,280	70.0	30
1978-79	450,070	315,049	70.0	30
1979-80a	497,354	348,148	-	35
1980-81	551,770	-	65.0	35
1981-82	569,799	370,369	65.0	35
1982-83	663,718	431,417	60.0	40
1983-84	700,436	420,262	55.0	45
1984-85	745,970	410,284	55.0	45
1985-86b	743,832	409,108	55.0	45
1986-87	732,131	402,832	54.9	45
	717,397	393,758		

a. Results were cancelled as per MEC Order No.27,S.1979 dated May 28, 1979.
b. Excludes 4,839 NCEE results due to rampant irregularities in the schools concerned.

Source: National Education Testing Center.

2.4 ORGANIZATION CHART OF PUP



2.5 PUP BUDGET (1987 - 1990, AND PROPOSED 1991)

POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
Manila

DETAILED BUDGET FOR FISCAL YEAR 1987

Particulars	Proposed Budget FY 1987	Approved Budget FY 1987	Increase (Decrease)
Personal Services:			
100-00 1) Itemized Positions	P 35,582,000	31,479,032.41	(P 4,102,967.59)
100-10 1) Others	53,578,000	46,950,624.62	(6,627,375.38)
Total Personal Services	89,160,000	78,429,657.03	(P10,730,342.97)
Maintenance and Other Operating Expenses:			
200-00 02 Travelling Expenses	P 540,000	458,612.06	(P 81,387.94)
03 Communication Services	430,000	191,491.13	(238,508.87)
04 Repair and Maintenance of National Government Facilities	107,000	-	(107,000.00)
05 Transportation Services	41,000	4,000.00	(37,000.00)
06 Other Services	2,000,000	4,065,760.23	2,065,760.23
Repair and maintenance of equipment	425,000	410,000.00	(15,000.00)
07 Supplies and materials	10,682,000	8,302,958.31	(2,379,041.69)
08 Rents	73,000	36,089.60	(36,910.40)
14 Water, Illumination and Power	4,516,000	4,020,405.99	(495,594.01)
15 Retirement Gratuities	4,289,000	922,989.06	(3,366,010.94)
Continuing Appropriation	-	-	-
17 Repair and maintenance of motor vehicles	260,000	533,985.60	273,985.60
18 Discretionary Expenses	68,000	45,000.00	(23,000.00)
19 Representation Expenses	366,000	270,493.85	(95,506.15)
22 Library Books and Materials	805,000	-	(805,000.00)
Total Maintenance and Other Operating Expenses	P 24,602,000	19,261,785.83	(P5,340,214.17)
Capital Outlays:			
300-00 31 Land and Land Improvements	-	-	-
32 Buildings and Structures Outlay	P 71,300,000	55,230,156.57	(P16,069,843.43)
33 Equipment Outlay	8,978,000	5,815,127.85	(3,162,872.15)
Total Capital Outlays	P 80,278,000	61,045,284.42	(P19,232,715.58)
GRAND TOTALS	P194,040,000	158,736,727.28	(P35,303,272.72)

Prepared by:

JOSE T. SADDI
University Budget Director

Date: December 4, 1989

POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
Manila

DETAILED BUDGET FOR FISCAL YEAR 1988

Particulars	Proposed Budget FY 1988	Approved Budget FY 1988	Increase (Decrease)
Personal Services:			
100-00 1) Itemized Positions	P 51,079,000	41,257,001	(P 9,821,999)
100-10 1) Others	77,599,000	45,938,738	(31,660,262)
Total Personal Services	P128,678,000	87,195,739	(P 41,482,261)
Maintenance and Other Operating Expenses:			
200-00			
02 Travelling Expenses	P 484,000	420,000	(P 64,000)
03 Communication Services	467,000	250,000	(217,000)
04 Repair and Maintenance of National Government Facilities	200,000	100,000	(100,000)
05 Transportation Services	145,000	75,000	(70,000)
06 Other Services	1,918,000	1,375,000	(543,000)
Repair and maintenance of equipment	550,000	515,000	(35,000)
07 Supplies and materials	8,838,000	5,072,000	(3,766,000)
08 Rents	195,000	69,000	(126,000)
14 Water, Illumination and Power	5,151,000	5,000,000	(151,000)
15 Retirement Gratuities	2,562,000	1,656,186	(905,814)
Continuing Appropriation	-	-	-
17 Repair and maintenance of motor vehicles	191,000	179,000	(12,000)
18 Discretionary Expenses	100,000	100,000	-
19 Representation Expenses	385,000	400,000	15,000
22 Library Books and Materials	810,000	350,000	(460,000)
Total Maintenance and Other Operating Expenses	P21,996,000	15,561,186	(P 6,434,814)
Capital Outlays:			
300-00			
31 Land and Land Improvements			
32 Buildings and Structures Outlay	P688,577,000	181,815,706	(P506,761,294)
33 Equipment Outlay	35,220,000	11,594,761	(23,625,239)
Total Capital Outlays	P723,797,000	193,410,467	(P530,386,533)
GRAND TOTALS	P874,471,000	296,167,392	(P578,303,608)

Prepared by:

JOSE T. SADDI
University Budget Director

Date: December 4, 1989

POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
Manila

DETAILED BUDGET FOR FISCAL YEAR 1989

Particulars	Proposed Budget FY 1989	Approved Budget FY 1989	Increase (Decrease)
Personal Services:			
100-00			
1) Itemized Positions	P 71,770,000	P 43,666,075	(P 28,103,925)
100-10			
1) Others	110,010,000	77,891,974	(32,118,026)
Total Personal Services	P181,780,000	P121,558,049	(P 60,221,951)
Maintenance and Other Operating Expenses:			
200-00			
02 Travelling Expenses	P 790,000	P 790,000	-
03 Communication Services	730,000	730,000	-
04 Repair and Maintenance of National Government Facilities .	300,000	300,000	-
05 Transportation Services	160,000	160,000	-
06 Other Services	2,610,000	2,274,000	(336,000)
Repair and maintenance of equipment	750,000	750,000	-
07 Supplies and materials	12,570,000	12,570,000	-
08 Rents	370,000	370,000	-
14 Water, Illumination and Power . .	8,180,000	8,180,000	-
15 Retirement Gratuities	3,710,000	4,666,372	956,372
Continuing Appropriation	-.-	3,442,000	3,442,000
17 Repair and maintenance of motor vehicles	350,000	350,000	-
18 Discretionary Expenses	150,000	550,000	400,000
19 Representation Expenses	790,000	390,000	(400,000)
22 Library Books and Materials . . .	3,100,000	3,100,000	-
Total Maintenance and Other Operating Expenses	P 34,560,000	P 38,622,372	P 4,062,372
Capital Outlays:			
300-00			
31 Land and Land Improvements . . .	-	P 1,000,000	P 1,000,000
32 Buildings and Structures Outlay .	P112,000,000	28,000,000	(84,000,000)
33 Equipment Outlay	23,249,000	11,857,000	(11,392,000)
Total Capital Outlays	P135,249,000	P 40,857,000	(P 94,392,000)
GRAND TOTALS	P351,589,000	P201,037,421	(P150,551,579)

Prepared by:

JOSE T. SADDI
University Budget Director

Date: December 4, 1989

POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
Manila

DETAILED BUDGET FOR FISCAL YEAR 1990

Particulars	Proposed Budget FY 1990	Approved Budget FY 1990	Increase (Decrease)
Personal Services:			
100-00 1) Itemized Positions	P 65,216,000	64,377,000	(P 839,000)
100-10 1) Others	252,194,000	85,458,000	(166,736,000)
Total Personal Services	P317,410,000	149,835,000	(P167,575,000)
Maintenance and Other Operating Expenses:			
200-00			
02 Travelling Expenses	P 1,950,000	835,000	(P 1,115,000)
03 Communication Services	1,365,000	1,365,000	-o-
04 Repair and Maintenance of National Government Facilities .	400,000	319,000	(81,000)
05 Transportation Services	800,000	169,000	(631,000)
06 Other Services	8,220,000	1,824,000	(6,396,000)
Repair and maintenance of equipment	2,000,000	1,200,000	(800,000)
07 Supplies and materials	20,200,000	13,459,000	(6,741,000)
08 Rents	850,000	850,000	-o-
14 Water, Illumination and Power . .	15,100,000	9,000,000	(6,100,000)
15 Retirement Gratuities	5,662,000	5,662,000	-o-
Continuing Appropriation	-o-	-o-	-o-
17 Repair and maintenance of motor vehicles	1,150,000	370,000	(780,000)
18 Discretionary Expenses	550,000	550,000	-o-
19 Representation Expenses	1,940,000	412,000	(1,528,000)
22 Library Books and Materials . . .	8,300,000	3,277,000	(5,023,000)
Total Maintenance and Other Operating Expenses	P 68,487,000	39,292,000	(P 29,195,000)
Capital Outlays:			
300-00			
31 Land and Land Improvements . . .	P 27,925,000	15,000,000	(P 12,925,000)
32 Buildings and Structures Outlay .	359,747,000	101,860,000	(257,887,000)
33 Equipment Outlay	25,185,000	4,000,000	(21,185,000)
Total Capital Outlays	P412,857,000	120,860,000	(P291,997,000)
GRAND TOTALS	P798,754,000	309,987,000	(P488,767,000)

Prepared by:

JOSE T. GADDI
University Budget Director

Date: December 4, 1989

POLYTECHNIC UNIVERSITY OF THE PHILIPPINES
Manila

DETAILED BUDGET FOR FISCAL YEAR 1991

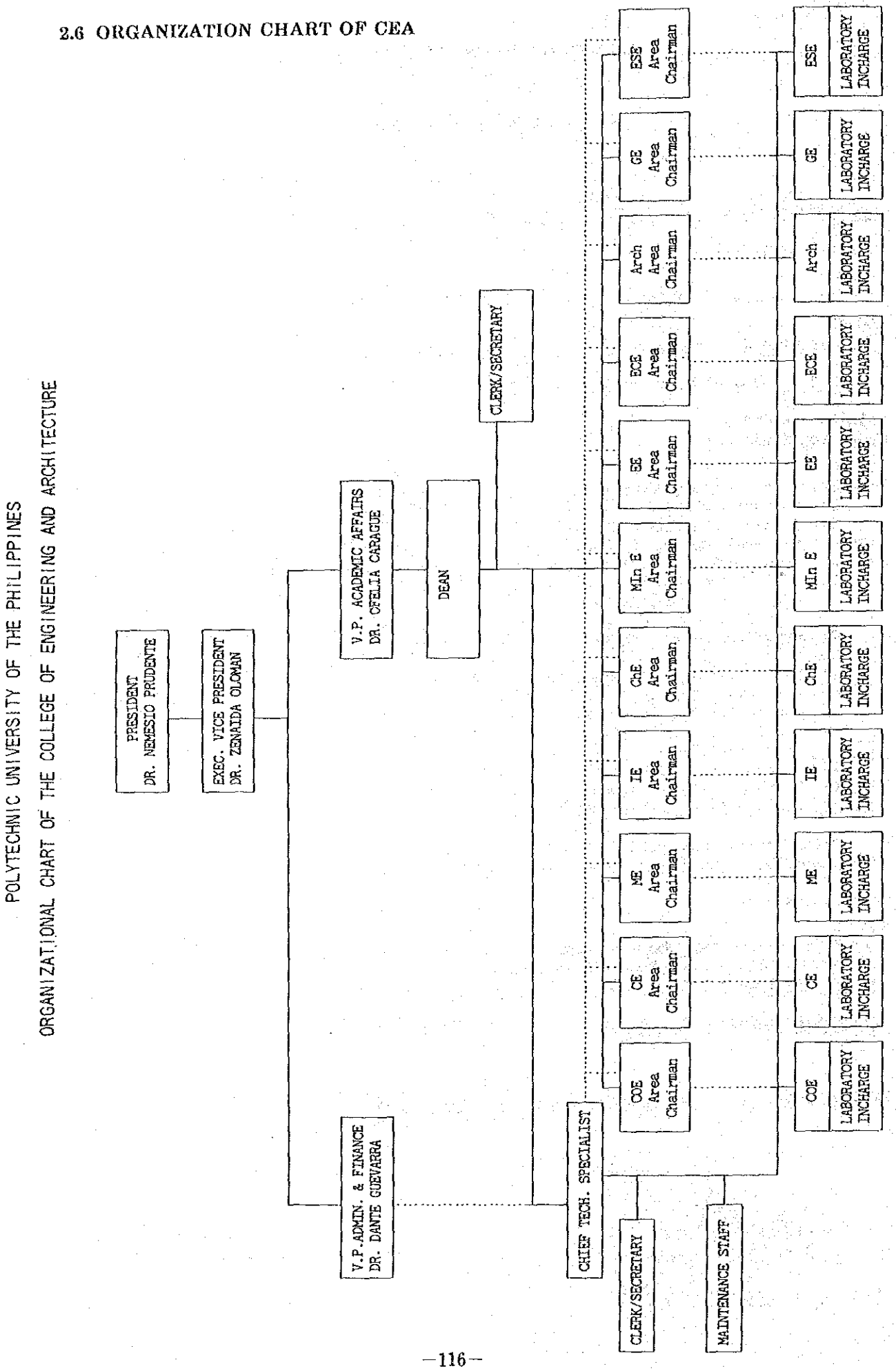
Particulars	Proposed Budget FY 1991	Approved Budget FY	Increase (Decrease)
Personal Services:			
100-00			
1) Itemized Positions	₱ 77,252,000		
100-10			
1) Others	352,194,000		
Total Personal Services	₱429,446,000		
Maintenance and Other Operating Expenses:			
200-00			
02 Travelling Expenses	2,500,000		
03 Communication Services	2,000,000		
04 Repair and Maintenance of National Government Facilities .	600,000		
05 Transportation Services	800,000		
06 Other Services	9,000,000		
Repair and maintenance of equipment	3,500,000		
07 Supplies and materials	20,500,000		
08 Rents	900,000		
14 Water, Illumination and Power . .	20,000,000		
15 Retirement Gratuities	5,662,000		
Continuing Appropriation	-.-		
17 Repair and maintenance of motor vehicles	3,000,000		
18 Discretionary Expenses	550,000		
19 Representation Expenses	2,500,000		
22 Library Books and Materials . . .	8,500,000		
Total Maintenance and Other Operating Expenses	₱ 80,012,000		
Capital Outlays:			
300-00			
31 Land and Land Improvements . . .	₱ 25,000,000		
32 Buildings and Structures Outlay .	260,000,000		
33 Equipment Outlay	30,000,000		
Total Capital Outlays	₱315,000,000		
GRAND TOTALS	₱824,458,000		

Prepared by:

JOSE T. SADDI
University Budget Director

Date: December 4, 1989

2.6 ORGANIZATION CHART OF CEA



2.7 CEA CURRICULUM

C O M M O N S U B J E C T S

S U B J E C T	U N I T	C O U R S E										
		COE	CE	ME	IE	EE	ECE	Arch	ChE	SE	GE	MiE
English Comm., P-1	3	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1
English Comm., P-2	3	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
Effective Speech	3	2-1	2-1	2-1	2-1	2-1	2-1	3-1	2-1	2-1	2-1	2-1
Technical Report Writing	3	2-2	2-2	2-2	2-2	2-2	2-2	3-2	2-2	2-2	2-2	2-2
Algebra	4	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1
Trigonometry	3	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1
Solid Geometry	3	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
Analytic Geometry	3	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
Differential Calculus	4	2-1	2-1	2-1	2-1	2-1	2-1		2-1	2-1	2-1	2-1
Differential Calculus	5							2-1				
Integral Calculus	4	2-2	2-2	2-2	2-2	2-2	2-2		2-2	2-2	2-2	2-2
Integral Calculus	5							2-2				
Advanced Eng'g Math.	3	3-2	3-2	3-2	3-2	3-2	3-2		3-2	3-2	3-2	3-2
Vector & Tensor Analysis	3	3-2										
Differential Equations	3	3-1	3-1	3-1	3-1	3-1	3-1		3-1	3-1	3-1	3-1
Chemistry I	4	1-1	1-1	1-1	1-1	1-1	1-1		1-1	1-1	1-1	11
Chemistry II	4	1-2	1-2	1-2	1-2	1-2	1-2		1-2	1-2	1-2	1-2
Physics I	4	2-1	2-1	2-1	2-1	2-1	2-1		2-1	2-1	2-1	2-1
Physics II	4	2-2	2-2	2-2	2-2	2-2	2-2		2-2	2-2	2-2	2-2
Physics I	3							2-1				
Physics II	3							2-2				
Modern Physics	3	3-1		5-1					3-1			
Eng'g Drafting I	2	1-1	1-1		1-1	1-1	1-1		1-1	1-1		1-1
Eng'g Drafting II	2	1-2	1-2		1-2	1-2	1-2		1-2	1-2		1-2
Architectural Drafting I	4			1-1				1-1			1-1	
Architectural Drafting II	4			1-2				1-2			1-2	
Small Scale Bus. & Coop.	3	1-1	1-1	1-1	1-1	1-2	1-2	4-2	1-1	3-2	1-2	1-2
Basic Financial Acctg.	3	4-1	2-1	1-2	1-2	1-1	1-1	4-1	1-2	2-2	1-1	1-1
Sining Pakikipagtalastasan	3	5-1	4-1	3-1	3-1	2-1	2-1	1-1	1-1	1-1	2-1	2-1
Panitikang Pilipino	3	5-2	4-2	3-2	3-2	2-2	2-2	1-2	1-2	1-2	2-2	2-2
Gen. Psychology	3	5-2	5-1	5-2	3-1	4-2	2-1	1-2	3-2	1-1	4-2	5-1
Intro to Political Science	3	4-2	5-2	2-1	2-1	2-1	4-2	5-1	5-2	4-2	4-2	4-2
Contemporary Social Problems	3	5-1	3-2	2-1	4-2	3-2	2-2	4-1	4-2	4-2	5-2	4-2
Works of Rigal & Other Heroes	3	3-2	5-2	4-2	4-2	3-2	5-1	5-2	2-1	5-1	5-1	5-1
Phil. History & Culture	3	5-1	4-2	5-1	2-1	3-1	5-2	5-2	5-1	5-2	5-2	5-2
Humanities	3	4-1	3-1	2-2	4-2	4-2	3-1	4-2	2-1	2-1	3-1	4-1
Probabilities & Statistics	3	3-1	4-2	3-2	4-2	4-2	3-1	3-1	3-1	3-1	3-1	3-1
Strength of Materials	5		3-2					3-2			3-2	3-2
Strength of Materials	3	3-2		3-2	3-2	3-2	4-1		3-2	3-1		
Eng'g Mechanics	5	3-1	3-1	3-1	3-1	3-1	3-2	3-1	3-1	3-1	3-1	3-1
Eng'g Economics	3	3-2	3-2	4-1	3-2	4-1	5-2	3-2	4-1	4-2	4-2	3-2
Principles of Eco. I	3			4-1								
Principles of Eco. II	3			4-1			5-1		5-1			
Eng'g Management	3	5-1	3-1	5-1	4-1	5-1	4-1	4-1	4-1	4-1	4-1	4-2
Obligations & Contract	3			4-1	3-2							

COURSE : COMPUTER ENGINEERING

YEAR	SEMESTER	SUBJECT	UNIT			TOTAL
			SPECIAL SUBJECT		COMMON	
				TOTAL	TOTAL	UNIT
1	1	COE111 Comp. Electronics I	4	4	21.5	25.5
	2	COE121 Electronics Eng'g I	4	8	17.5	25.5
		CS121 Intro to EDP Fund.	4			
2	1	COE211 Comp. Electronics II	4	12	13.5	25.5
		CS211 Software Language I	3			
		COE213 Digital Comp. I	5			
	2	COE221 Microprocessor	5	12	13.5	25.5
		CS221 Software Language II	3			
		COE223 Electronics Eng'g II	4			
3	1	ME320 Thermo & Heat Trans.	3	10	14	24
		COE311 Solid State Physics I	3			
		CS311 Software Language III	4			
	2	COE320 Discrete Mathematics	2	7	15	22
		COE321 Digital Comp. II	3			
		CS321 Software Eng'g I	2			
4	1	ME324 Eng'g Materials	3	15	6	21
		COE411 Comp. Systems	3			
		COE413 Communication Eng'g I	3			
		COE414 Analog Comp. I	3			
		COE415 Comp. Electronics III	3			
	2	COE421 Comp. Electronics IV	4	16	3	19
		CS421 Software Eng'g II	3			
		COE423 Communication Eng'g II	3			
		COE424 Analog Comp. II	3			
		COE425 Digital Comp. IV	2			
		COE426 Comp. Support Facilities Eng'g	1			
5	1	COE511 Digital Comp. V	3	10	12	22
		CS511 Software Eng'g III	3			
		COE513 Analog Comp. III	4			
	2	COE521 Comp. Maintenance & Operation	3	13	6	19
		CS521 Software Eng'g IV	4			
		CS522 Software Eng'g V	2			
		CS523 EDP Management & Safety Eng'g	2			
		COE525 Practicum/Inspection Trips	1			
		COE526 Thesis	1			
		TOTAL		107	122	229

COURSE : CIVIL ENGINEERING

YEAR	SEMESTER	SUBJECT		UNIT			TOTAL
				SPECIAL SUBJECT		COMMON	
					TOTAL	TOTAL	UNIT
1	1	CE111	C.E. Eng'g Technology I	5	5	21.5	26.5
	2	CE121	C.E. Eng'g Technology II	5	7	17.5	24.5
		CE123	Environmental Science	2			
2	1	CE211	C.E. Eng'g Technology III	5	9	16.5	25.5
		CE212	Elementary Surveting	4			
	2	CE221	C.E. Eng'g Technology IV	5	9	13.5	22.5
		CE222	Higher Surveting	4			
3	1	EE310	Elements of E.E.	3	9	14	23
		CE312	Eng'g Surveying	3			
		CE313	Eng'g Geology	3			
	2	ME320	Thermo Dynamics & Heat	3	12	14	23
		CE323	Construction Materials & Testing	3			
		CE324	Eng'g Economics	3			
		CS120	Comp. Fund. & Prog.	3			
4	1	CE411	Soil Mechanics	4	20	3	23
		CE412	Structural Theory I	5			
		CE413	Fluid Mechanics	4			
		CE414	Highway Eng'g	3			
		CE415	Timber Design	3			
		CE400	Practicum	1			
	2	CE422	Structural Theory II	3	14	9	23
		CE423	Hydraulics	4			
		CE424	Steel Design	5			
		CE425	Urban Trans. & Planning	2			
5	1	CE511	Prin. of Reinforced Conc.	3	18	3	21
		CE512	Hydrology	3			
		CE513	Construction Project Management	3			
		CE514	Contracts CE Laws & Spec.	3			
		CE515	Elective I	2			
		CE516	Elective II	2			
		CE522	Earthquake Eng'g	2			
	2	CE521	Reinforced Concrete Design	4	12	6	18
		CE523	Foundation Eng'g	3			
		CE524	Proj. Study	2			
		CE525	Field Trips & Seminars	1			
		CE526	Elective III	2			
		TOTAL			115	118	230

COURSE : MECHANICAL ENGINEERING

YEAR	SEMESTER	SUBJECT		UNIT			TOTAL
				SPECIAL SUBJECT		COMMON	
					TOTAL	TOTAL	UNIT
1	1	ME111	M.E. Tech. I	5	5	21.5	26.5
	2	ME121	M.E. Tech. II	5	5	20.5	25.5
2	1	ME211	M.E. Tech. III	5	5	19.5	24.5
	2	ME221	M.E. Tech. IV	3	8	16.5	24.5
		CS120	Comp. Fund. & Prog.	5			
3	1	ME312	Eng'g Materials & Geology	3	11	11	22
		ME311	M.E. Tech. V	5			
		ECE310	Basic Electronics	3			
	2	ME321	Thermo Dynamics I	3	14	12	26
		ME322	Kinematics & Machine Elements	3			
		ME323	M.E. Tech. VI	5			
		EE320	Elements of E.E.	3			
4	1	ME411	Thermo Dynamics II	3	15	6	21
		ME412	Fluid Mechanics	4			
		ME413	Materials Eng'g & Testing	3			
		ME414	M.E. Laboratory I	2			
		EE410	DC & AC Machinery	3			
	2	ME421	Fluid Mechanics	3	17	3	20
		ME422	Heat Transfer	2			
		ME423	Machine Design I	4			
		ME424	M.E. Laboratory II	2			
		ME425	Refrigeration System & Eng'g	3			
		ME426	Internal Combustion Engine	3			
5	1	ME511	Ind'l Aircon Des.	3	10	9	19
		ME512	Safety Eng'g & Ind'l Hygine	1			
		ME513	Machine Design II	4			
		ME514	M.E. Laboratory III	2			
	2	ME521	Contracts ME Laws & Spec.	2	16	3	19
		ME522	Power Plant Design	5			
		ME523	Ind'l Plant Design	4			
		ME524	Ind'l Process & Plant Inspection	3			
		ME525	Intro. to Nuclear Eng'g	2			
		TOTAL			106	122	228

COURSE : INDUSTRIAL ENGINEERING

YEAR	SEMESTER	SUBJECT		UNIT			TOTAL
				SPECIAL SUBJECT		COMMON	
					TOTAL	TOTAL	UNIT
1	1	PT111	Printing Theory I	5	5	21.5	26.5
	2	PT121	Printing Theory II	5	5	20.5	25.5
2	1	PT211	Printing Theory III	5	5	19.5	24.5
	2	CS120	Comp. Fund. & Prog.	3	8	13.5	21.5
		PT221	Printing Theory IV	5			
3	1	IE311	Ind'l Bus. Statistics	3	10	14	24
		IE312	Ind'l Materials & Processes	6			
		IE313	Ind'l Safety Eng'g	1			
	2	EE320	Elements of E.E.	3	6	15	21
		MN340	Personnel Management	3			
4	1	ME320	Thermo Dynamics & Heat	3	14	9	23
		ME412	Fluid Mechanics	3			
		IE411	Methods Eng'g	5			
		IE412	Quality Control	3			
	2	MN	Risk & Investment Mgnt.	2	10	12	22
		IE423	Systems Eng'g	3			
		IE424	Materials & Investment Mgnt.	2			
		IE425	Human Factor Eng'g	3			
5	1	FN310	Financial Management	3	20	—	20
		MK410	Marketing Mgnt. for Ind'l Eng'g	3			
		IE513	Operation Research I	3			
		MN350	Ind'l Organization & Management	3			
		IE515	Enterprise Planning	3			
		IE516	Ind'l Creativity & Patent Practice	2			
		IE517	Ind'l Systems Dynamic	3			
	2	ME310	Elements of M.E.	3	19	—	23
		IE521	Operation Research II	3			
		IE522	Plant Layout	2			
		IE523	Ind'l Agri-Business Dev.	2			
		MN430	Policy Formulation & Decision Making	3			
		IE525	Operation Analysis & Ind'l Design	3			
		IE526	Production Planning & Control	3			
		TOTAL			102	125	230

COURSE : ELECTRICAL ENGINEERING

YEAR	SEMESTER	SUBJECT		UNIT			TOTAL
				SPECIAL SUBJECT		COMMON	
					TOTAL	TOTAL	UNIT
1	1	EE111	Elect. Theory & W'shop I	5	5	21.5	26.5
	2	EE121	Elect. Theory & W'shop II	5	5	20.5	25.5
2	1	EE211	Elect. Theory & W'shop III	5	5	19.5	24.5
	2	ME210	Survey of M.E.	2	7	16.5	23.5
		EE221	Elect. Theory & W'shop IV	5			
3	1	ECE110	Basic Electronics	4	10	11	21
		CE210	Elementary Surveying	2			
		EE311	DC Circuits	4			
	2	ME312	Eng'g Materials & Geology	3	10	12	22
		EE321	A.C. Circuits	4			
		CS120	Comp. Fund. & Prog.	3			
4	1	COE210	Comp. Systems	3	17	3	20
		ME410	Thermo Dynamics & Heat	3			
		EE415	Electronics	4			
		EE411	Electrical Mach. I	4			
		EE412	Electromagnetics	3			
	2	ME430	Fluid Mech. & Hydro. Mach.	3	13	9	22
		EE423	Advanced A.C. Circuits	3			
		EE421	Electrical Mach. II	4			
		EE422	Electrical Transients	3			
5	1	EE511	Communication Eng'g	3	15	3	18
		EE512	Machineries & Foundation	1			
		EE513	Electrical Machine Design	2			
		EE514	Electro-Mech. Energy Conv.	3			
		EE515	Illumination Eng'g	2			
		EE516	Electrical Equipment	2			
		EE517	Contracts EE Laws & Spec.	2			
	2	ME420	Internal Combustion Engine	3	18	—	18
		SE521	Safety Eng'g & Ind'l Hygine	1			
		EE521	Ind'l Electronics	3			
		EE522	Electrical System And Power Plant	4			
		EE523	Power System	3			
		EE524	Instrumentation Control	3			
		EE525	Field Tripe & Seminars	1			
		TOTAL			105	116	221

COURSE : ELECTRONICS ENGINEERING

YEAR	SEMESTER	SUBJECT		UNIT			TOTAL
				SPECIAL SUBJECT		COMMON	
					TOTAL	TOTAL	UNIT
1	1	ECE111	Electronics Theo. & W'shop I	5	5	21.5	26.5
	2	ECE121	Electronics Theo. & W'shop II	5	5	20.5	25.5
2	1	ECE211	Electronics Theo. & W'shop III	5	5	19.5	24.5
	2	ECE221	Electronics Theo. & W'shop IV	5	5	19.5	24.5
3	1	CS120	Comp. Fund. & Prog.	3	13	9	22
		ECE311	Electronics Eng'g I	3			
		ECE312	Circuits I	4			
		ECE313	Eng'g Materials	3			
	2	ME320	Thermo Dynamics & Heat	3	14	8	22
		ECE321	Electronics Eng'g II	4			
		ECE322	Circuits II	4			
		ECE323	Ind'l Electronics	3			
4	1	ECE411	Electronics Eng'g III	4	14	6	20
		ECE412	Electromagnetics	3			
		ECE413	Switching Theory Logic	3			
		ECE414	Prin. of Communication	3			
		ECE415	Communication Laboratory	1			
	2	ECE425	Energy Conversion	4	18	3	21
		ECE421	Trans. Line & Antena	3			
		ECE422	Elecatronics System Design	4			
		ECE423	Communication Sys. Analysis Des.	4			
		ECE424	Control System	3			
5	1	ECE511	Practicum	2	15	3	18
		ECE512	Wireless Communication	3			
		ECE513	Wire Communication	3			
		ECE515	Comp. Sys. Architecture	3			
		ECE516	Microprocessor	4			
	2	ECE522	Data Communication	3	12	6	18
		ECE523	Electrical Navigational Aids	3			
		ECE524	Contracts ECE Laws & Ethics	2			
		ECE525	Broadcast Eng'g & Accoustics	3			
		ECE526	Field Tripe & Seminars	1			
		TOTAL			106	116	222

COURSE : ARCHITECTURE ENGINEERING

YEAR	SEMESTER	SUBJECT	UNIT			TOTAL
			SPECIAL SUBJECT		COMMON	
				TOTAL	TOTAL	UNIT
1	1	ARCH111 Architectural Design I	2	4	19.5	23.5
		ARCH113 Visual Techniques I	2			
	2	ARCH121 Architectural Design II	2	8	21.5	27.5
		ARCH122 Perspective Shades & Shadows	4			
		ARCH123 Visual Techniques II	2			
2	1	CE210 Elementary Surveying	2	14	10.5	24.5
		ARCH211 Architectural Design III	4			
		ARCH212 History of Architectural I	3			
		ARCH213 Visual Techniques III	2			
		ARCH214 Building Technology I	3			
	2	ARCH221 Architectural Design IV	4	16	10.5	26.5
		ARCH222 History of Architectural II	3			
		2ARCH223 Utilities I	3			
		ARCH224 Building Technology II	3			
		ARCH225 Theory of Architectural Design I	3			
3	1	ES312 Eng'g Science I	3	18	11	24
		ARCH311 Architectural Design V	4			
		ARCH312 History of Architectural III	2			
		ARCH313 Utilities II	3			
		ARCH314 Building Technology III	3			
		ARCH315 Theory of Architectural Design II	3			
	2	CS220 Intro. to Basic Comp. Programming	2	20	11	28
		ARCH321 Architectural Design VI	4			
		ARCH322 Professional Practice I	3			
		ARCH324 Building Technology IV	3			
		ARCH326 Planning I	3			
		ES321 Eng'g Science II	5			
4	1	NS Earth and Life Science	3	15	9	24
		ARCH411 Architectural Design VII	4			
		ARCH414 Architectural Structure I	3			
		ARCH416 Planning II	3			
		ARCH412 Interior Design	2			
	2	ARCH421 Architectural Design VIII	4	16	6	25
		ARCH424 Architectural Structure II	5			
		ARCH426 Planning III	3			
		ARCH422 Tropical Architecture	2			
		ARCH425 Research Method for Architecture	2			
5	1	ARCH511 Architectural Design IX	4	12	6	18
		ARCH514 Architectural Structure III	3			
		ARCH512 Professional Practice II	3			
		ARCH513 Utilities III	2			
	2	ARCH521 Architectural Design X	5	14	6	20
		ARCH524 Architectural Structure IV	4			
		ARCH522 Professional Practice III	3			
		ARCH526 Housing	2			
		TOTAL		137	111	241

COURSE : CHEMICAL ENGINEERING

YEAR	SEMESTER	S U B J E C T		UNIT			TOTAL
				SPECIAL SUBJECT		COMMON	
					TOTAL	TOTAL	UNIT
1	1	CHE111	Chemical Eng'g Orientation	1	1	24.5	25.5
	2			—	—	23.5	23.5
2	1	CHE211	Qualitative Chemistry	5	5	19.5	24.5
	2	CHE221	Quantitative Chemistry	5	10	13.5	23.5
		CHE222	Introduction to Chemical Eng'g	5			
3	1	CHE311	Ind'l Stoichiometry I	3	8	14	22
		CHE312	Organic Chemistry I	5			
	2	CHE321	Ind'l Stoichiometry II	3	15	9	24
		CHE322	Organic Chemistry II	5			
		CS120	Comp. Fund. & Prog.	3			
		CHE323	Physical Chemistry I	4			
4	1	CS2	Advanced Comp. Programming	3	21	6	27
		EE1	Elementary Electrical Eng'g	3			
		CHE411	Chemical Eng'g Thermo I	3			
		CHE412	Chemical Process Industries I	3			
		CHE413	Physical Chemistry II	4			
		CHE414	Unit Operations I	5			
	2	EE2	Advanced Electrical Eng'g	3	22	3	25
		CHE421	Chemical Eng'g Thermo II	3			
		CHE422	Chemical Process Industries II	3			
		CHE423	Unit Operations Laboratories I	2			
		CHE424	Unit Operations II	5			
		CHE425	Chemical Eng'g Economics	3			
		CHE426	Chemical Reaction Eng'g I	3			
5	1	CHE511	Chemical Reaction Eng'g II	3	21	3	24
		CHE512	Process Equipment Design	5			
		CHE513	Unit Operations Laboratories II	2			
		CHE514	Biochemical Eng'g	3			
		CHE515	Chemical Eng'g Management	3			
		CHE516	Chemical Process Industries III	5			
	2	CHE521	Instrumentation	2	18	3	21
		CHE522	Contracts CHE Laws & Ethics	1			
		CHE523	Plant Design & Project Study	5			
		CHE524	Envilonmental Management	3			
		CHE525	Plant Inspection & Seminar	2			
		CHE526	Chemical Process Industries IV	5			
		T O T A L			121	119	240

COURSE : SANITARY ENGINEERING

YEAR	SEMESTER	SUBJECT		UNIT			TOTAL
				SPECIAL SUBJECT		COMMON	
					TOTAL	TOTAL	UNIT
1	1			—	—	24.5	24.5
	2	SE121	Introduction to Sanitary Eng'g	3	3	20.5	23.5
2	1	CS120	Comp. Fund. & Prog.	3	9	16.5	22.5
		SE211	Envilonmental Science	3			
		SE212	Sanitary Eng'g I	3			
	2	CE1	Elementary Surveying	4	7	16.5	23.5
		SE221	Sanitary Eng'g II	3			
3	1	CE2	Civil Eng'g Technology	3	10	14	24
		CE3	Higher Surveying	4			
		CE4	Principles of Geology	3			
	2	CE5	Fluid Mechanics	4	17	6	23
		CE6	Structural Theory I	3			
		EE1	Electrical Circuit(DC)	3			
		ME1	Thermo Dynamics	3			
		SE321	Sanitary Eng'g III	4			
4	1	SE411	Envilonmental Sanitation	3	21	3	24
		SE412	Structural Theory II	3			
		CE7	Hydrology	3			
		CE8	Hydraulics	4			
		CE9	Construction Materials	3			
		SE413	Sanitary Chemistry I	3			
		SE414	Occupational Health	2			
	2	CE10	Soil Mechanics	4	15	9	24
		CE11	Structural Design I	5			
		SE421	Water Supply Eng'g	3			
		SE422	Microbiology I	3			
5	1	SE511	Air & Noise Pollutions	2	18	6	24
		SE512	Envilonment Impact Assessment	3			
		SE513	Sewerage & Sewerage Disposal	3			
		SE514	Sanitary Chemistry II	4			
		CE12	Structural Design II	4			
		SE515	Envilonmental Laws, Contracts	2			
	2	CE13	Construction Project Management	3	18	3	21
		SE521	Ind'l Wastewater Treatment	2			
		SE522	Solid Waste Management	2			
		SE523	Advanced Water Treatment	2			
		SE524	Advanced Wastewater Treatment	2			
		SE525	Envilonmental & Sanitary Eng'g	2			
		SE526	Treatment Plant Design	3			
		SE527	Plant Inspection & Seminar	2			
		TOTAL			118	119	234

COURSE : GEODETIC ENGINEERING

YEAR	SEMESTER	SUBJECT		UNIT			TOTAL
				SPECIAL SUBJECT		COMMON	
					TOTAL	TOTAL	UNIT
1	1	GE	Geodetic Eng'g Workshop I	5	5	21.5	26.5
	2	GE	Geodetic Eng'g Workshop II	5	5	20.5	25.5
2	1	GE211	Elementary Surveying	4	9	16.5	22.5
		GE	Geodetic Eng'g Workshop III	5			
	2	GE221	Higher Surveying	4	9	16.5	25.5
		GE	Geodetic Eng'g Workshop IV	5			
3	1	CS120	Comp. Fund. & Prog.	3	9	14	23
		GE311	Eng'g Surveying	3			
		GE0311	Eng'g Geology	3			
	2	ME320	Thermo Dynamics & Heat	3	14	8	22
		EE	Elementary Electrical Eng'g	3			
		GE321	Cadastral Survey	3			
		GE322	Laws on Property	2			
		GE323	Land Registration Laws	3			
4	1	CE4	Fluid Mechanics	3	17	3	23
		GE411	Public Land Laws	3			
		GE412	Isolated Land Survey	3			
		GE413	Mine Survey	3			
		GE414	Elementary Cartography	2			
		GE415	Introductory Photogrammetry	3			
	2	GE424	Advanced Cartography	3	12	9	21
		GE425	Stereophotogrammetry	3			
		GE426	Geodesy	3			
		GE427	Geodetic Surveing	3			
5	1	GE516	Physical Geodesy	2	15	3	18
		GE517	Geodetic Leveling	3			
		GE518	Geodetic Astronomy	3			
		GE519	Geodetic Data Adjustment I	2			
		GE	Elective I	5			
	2	GE529	Geodetic Data Adjustment II	3	12	6	18
		GE521	Contracts GE Laws & Ethics	3			
		GE515	Photo Interpretation	3			
		GE	Elective II	3			
		TOTAL			107	118	225

COURSE : MINING ENGINEERING

YEAR	SEMESTER	SUBJECT		UNIT			TOTAL UNIT
				SPECIAL SUBJECT		COMMON TOTAL	
					TOTAL		
1	1	MIET	Mining Eng'g Workshop I	5	5	21.5	26.5
	2	MIET	Mining Eng'g Workshop II	5	5	20.5	25.5
2	1	GE111	Elementary Surveying	4	9	16.5	22.5
		MIET	Mining Eng'g Workshop III	5			
	2	GE1	Topographic/Mine Survey	4	9	16.5	25.5
		MIET	Mining Eng'g Workshop IV	5			
3	1	CS120	Comp. Fund. & Prog.	3	10	11	21
		MIE311	Principles of Mining	3			
		GED311	Principles of Geology	4			
	2	ME320	Thermo Dynamics	3	13	11	24
		EE1	Elementary Electrical Eng'g	3			
		MIE321	Principles of Metallurgy	3			
		GEOL320	Elementary Mineralogy	4			
4	1	MIE411	Surface Mining	2	16	3	19
		MIE412	Underground Mining	2			
		MIE413	Mining Laws	1			
		GEOL	Elementary Petrology	3			
		MIE414	Ore Dressing	3			
		CE1	Fluid Mechanics	3			
		MIE415	Coal Mining	2			
	2	MIE421	Rock Mechanics	3	12	9	21
		MIE422	Mineral Process I	3			
		GEOL421	Structural Geology	4			
		GE2	Elementary Geodesy	2			
5	1	MIE511	Mine Management & Safety	2	16	6	22
		MIE512	Mine Economics	3			
		GEOL511	Metal Deposits	5			
		GEOL513	Mine Plant Disign I	3			
		MIE	Elective I	3			
	2	MIE521	Mine Plant Design II	3	17	3	20
		MIE522	Mine Ventilation	3			
		MIE523	Mine Seminar	1			
		METE1	Methods of Metallurgy	2			
		MIE524	Mineral Dressing Process	5			
		MIE	Elective II	3			
		TOTAL			112	118	127

Personal Computer Room

CODE	Curriculum	Dept.	Grade	Sem.	Classes	Unit	F. Sem.	S. Sem.	Total
CO-111	Comp. Electronics I	COE	1	1	7	4	28	0	28
CO-210	Comp. Systems	EE	4	1	3	3	9	0	9
CO-211	Comp. Electronics II	COE	2	1	6	4	24	0	24
CO-321	Digital Computer II	COE	3	2	6	3	0	18	18
CO-411	Comp. Systems	COE	4	1	4	3	12	0	12
CO-425	Digital Computer IV	COE	4	2	4	2	0	8	8
CS-120	Comp. Fund. & Prog.	CE	3	2	3	3	0	9	9
CS-120	Comp. Fund. & Prog.	ME	2	2	3	3	0	9	9
CS-120	Comp. Fund. & Prog.	IE	2	2	3	3	0	9	9
CS-120	Comp. Fund. & Prog.	EE	3	2	3	3	0	9	9
CS-120	Comp. Fund. & Prog.	ECE	3	1	6	3	18	0	18
CS-121	Intro to EDP Fund.	COE	1	2	7	4	0	28	28
CS-211	Software Language I	COE	2	1	6	3	18	0	18
CS-221	Software Language II	COE	2	2	6	3	0	18	18
CS-311	Software Language III	COE	3	1	6	4	24	0	24
CS-321	Software Eng'g I	COE	3	2	6	2	0	12	12
CS-421	Software Eng'g II	COE	4	2	4	3	0	12	12
EC-422	Elecatronics System Design	ECE	4	2	4	4	0	12	12
EC-515	Comp. Sys. Architecture	ECE	5	1	5	3	15	0	15
EE-211	Elect. Theory & W'shop III	EE	2	1	3	5	9	0	9
EE-221	Elect. Theory & W'shop IV	EE	2	2	3	5	0	9	9
EE-514	Electro-Mech. Energy Conv.	EE	5	1	3	3	6	0	6
IE-423	Systems Enginnering	IE	4	2	3	3	0	6	6
	Total Unit						163	159	322

Remarks
Sem. :Semestor
F. Sem. :First Semester
S. Sem. :Second Semester

Mechanical Drafting Room

CODE	Curriculum	Dept.	Grade	Sem.	Classes	Unit	F. Sem.	S. Sem.	Total
DR-111	Eng'g Drafting I	COE	1	1	7	2	14	0	14
DR-111	Eng'g Drafting I	ME	1	1	4	2	8	0	8
DR-111	Eng'g Drafting I	IE	1	1	4	2	8	0	8
DR-111	Eng'g Drafting I	EE	1	1	4	2	8	0	8
DR-111	Eng'g Drafting I	ECE	1	1	7	2	14	0	14
DR-121	Eng'g Drafting II	COE	1	2	7	2	0	14	14
DR-121	Eng'g Drafting II	ME	1	2	4	2	0	8	8
DR-121	Eng'g Drafting II	IE	1	2	4	2	0	8	8
DR-121	Eng'g Drafting II	EE	1	2	4	2	0	8	8
DR-121	Eng'g Drafting II	ECE	1	2	7	2	0	14	14
EE-513	Electrical Machine Design	EE	5	1	3	2	3	0	3
IE-522	Plant Layout	IE	5	2	2	2	0	2	2
ME-423	Machine Design I	ME	4	2	3	4	0	3	3
ME-513	Machine Design II	ME	5	1	3	4	3	0	3
ME-523	Industrial Plant Design	ME	5	2	3	4	0	3	3
	Total Unit						58	60	118

Remarks
Sem. :Semestor
F. Sem. :First Semester
S. Sem. :Second Semester

Cad Room

CODE	Curriculum	Dept.	Grade	Sem.	Classes	Unit	F. Sem.	S. Sem.	Total
AR-225	Theory of Architectural Design I	ARCH	2	2	3	3	0	3	3
AR-315	Theory of Architectural Design II	ARCH	3	1	3	3	6	0	6
AR-511	Architectural Design IX	ARCH	5	1	3	4	6	0	6
AR-521	Architectural Design X	ARCH	5	2	3	5	0	6	6
CE-222	Higher Surveting	CE	2	2	3	4	0	6	6
CE-412	Structural Theory I	CE	4	1	3	5	9	0	9
CE-422	Structural Theory II	CE	4	2	3	3	0	3	3
IE-522	Plant Layout	IE	5	2	2	2	0	2	2
ME-424	M.E. Laboratory II	ME	4	2	3	2	0	3	3
ME-513	Machine Design II	ME	5	1	3	4	9	0	9
	Total Unit						30	23	53

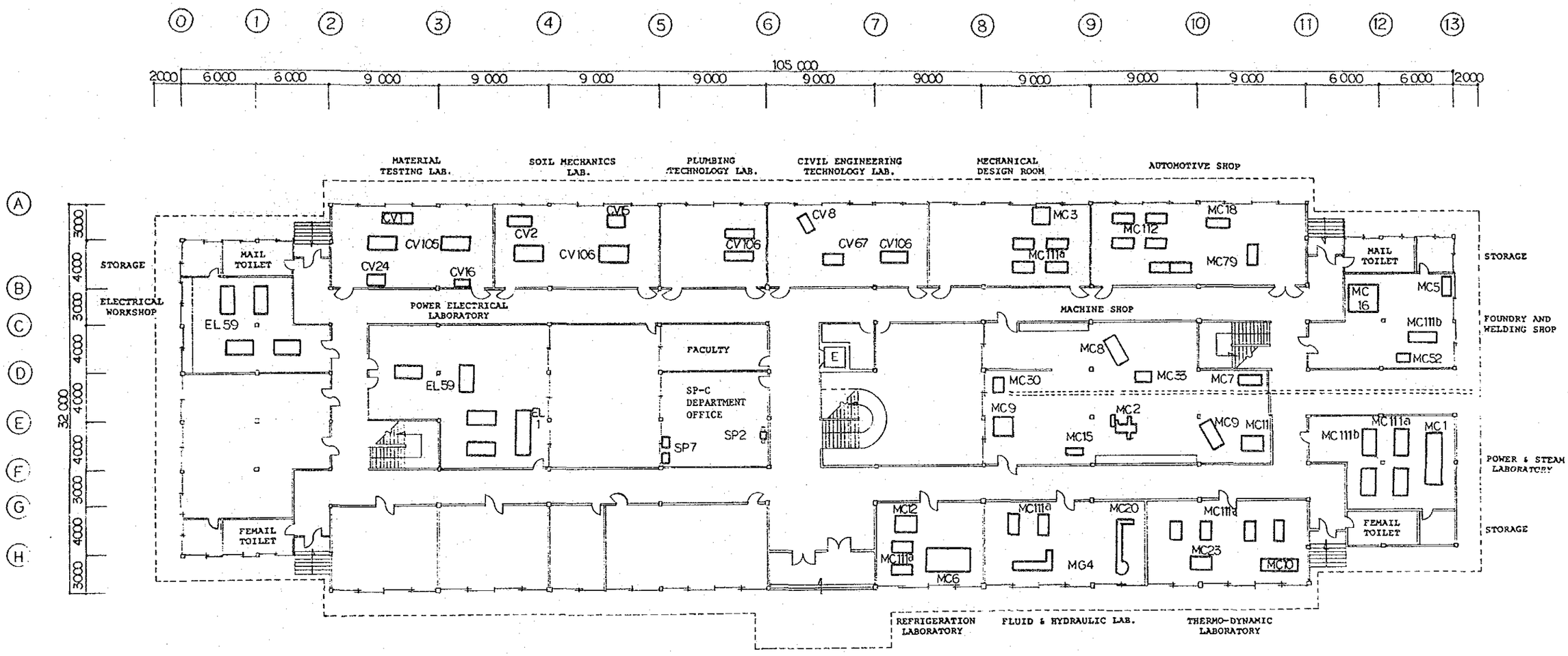
Remarks
Sem. :Semestor
F. Sem. :First Semester
S. Sem. :Second Semester

Architecture Drafting Room

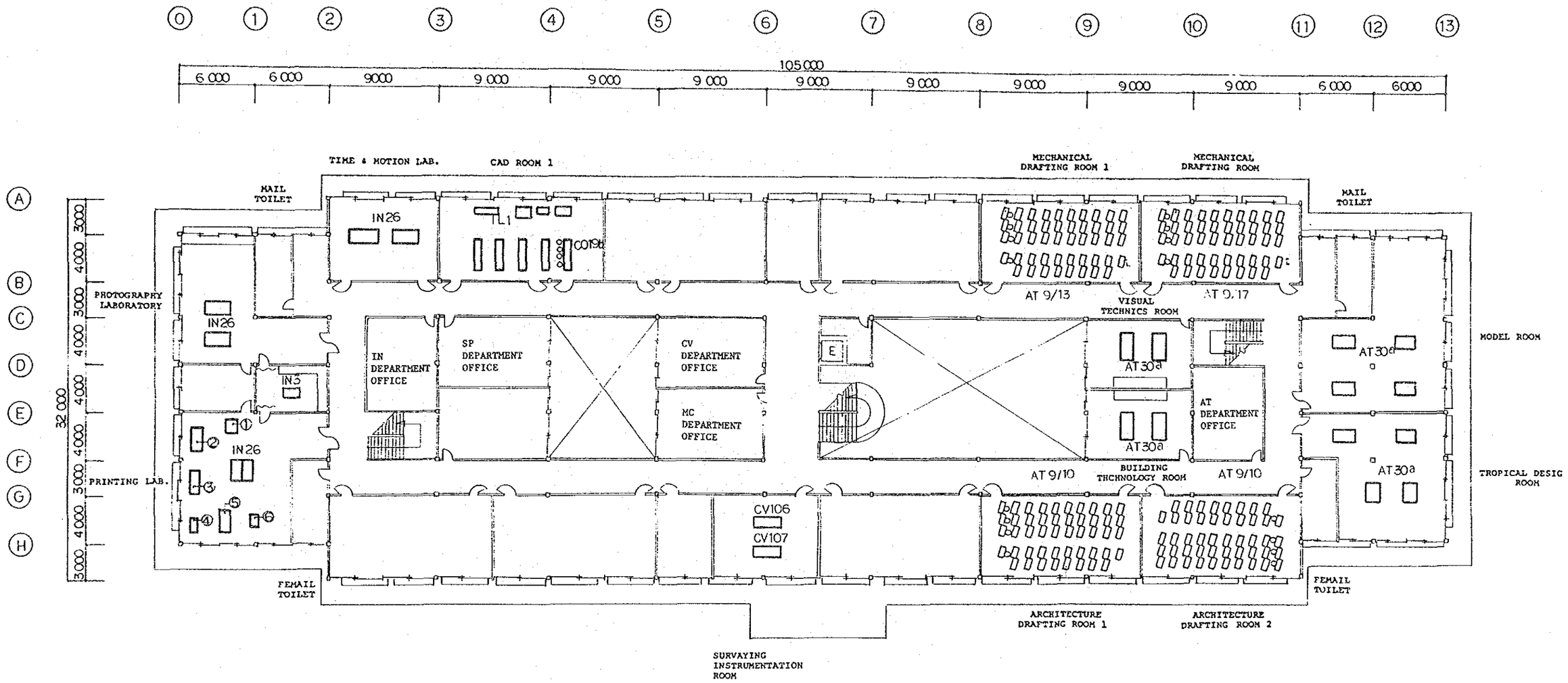
CODE	Curriculum	Dept.	Grade	Sem.	Classes	Unit	F. Sem.	S. Sem.	Total
AR-111	Architectural Design I	ARCH	1	1	4	2	4	0	4
AR-112	Architectural Drafting I	ARCH	1	1	4	4	16	0	16
AR-112	Architectural Drafting I	CE	1	1	4	4	16	0	16
AR-121	Architectural Design II	ARCH	1	2	4	2	0	4	4
AR-124	Architectural Drafting II	ARCH	1	2	4	4	0	16	16
AR-124	Architectural Drafting II	CE	1	2	4	4	0	16	16
AR-211	Architectural Design III	ARCH	2	1	3	4	3	0	3
AR-221	Architectural Design IV	ARCH	2	2	3	4	0	3	3
AR-311	Architectural Design V	ARCH	3	1	3	4	3	0	3
AR-321	Architectural Design VI	ARCH	3	2	3	4	0	3	3
AR-326	Planning I	ARCH	3	2	3	3	0	3	3
AR-411	Architectural Design VII	ARCH	4	1	3	4	6	0	6
AR-416	Planning II	ARCH	4	1	3	3	3	0	3
AR-421	Architectural Design VIII	ARCH	4	2	3	4	0	6	6
AR-426	Planning III	ARCH	4	2	3	3	0	3	3
AR-511	Architectural Design IX	ARCH	5	1	3	4	6	0	6
AR-521	Architectural Design X	ARCH	5	2	3	5	0	6	6
	Total Unit						57	60	117

Remarks
Sem. :Semestor
F. Sem. :First Semester
S. Sem. :Second Semester

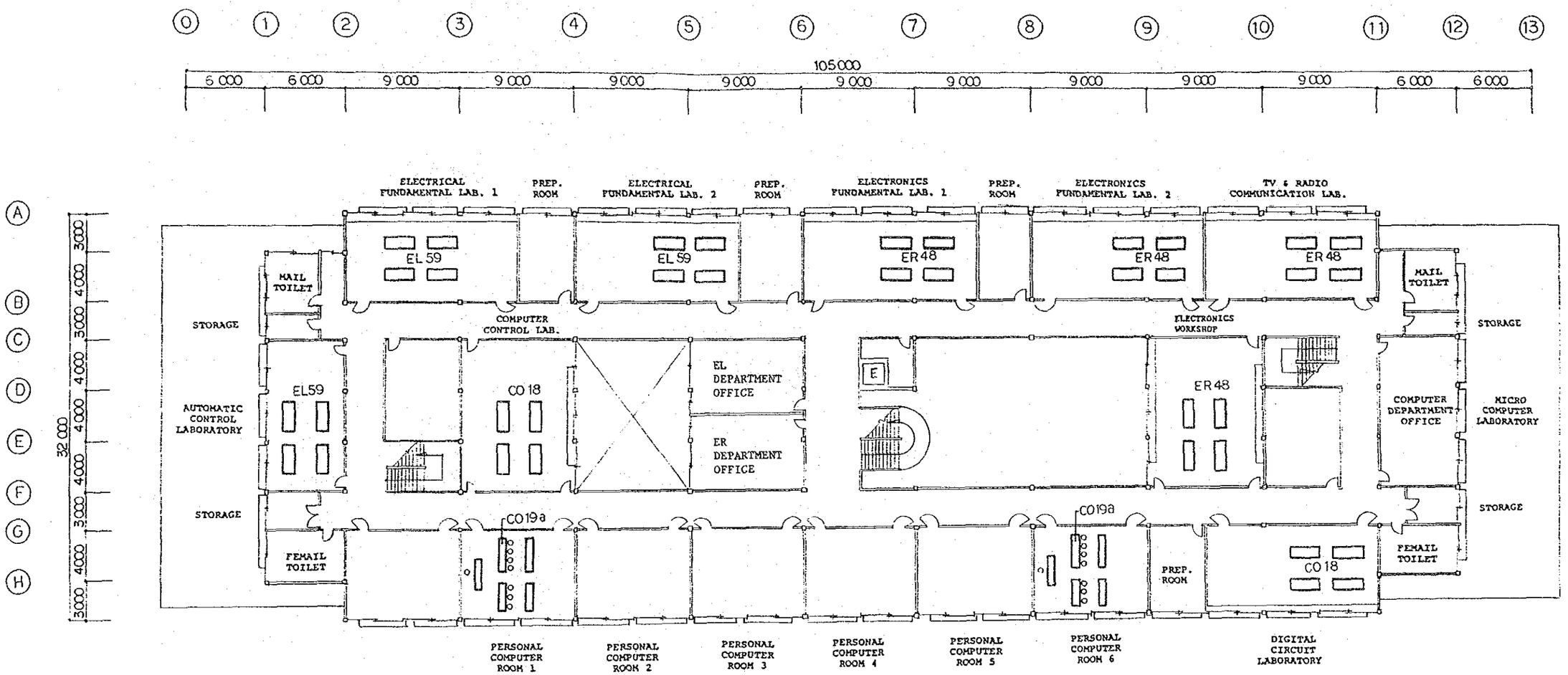
2.8 LAYOUT OF THE EQUIPMENT



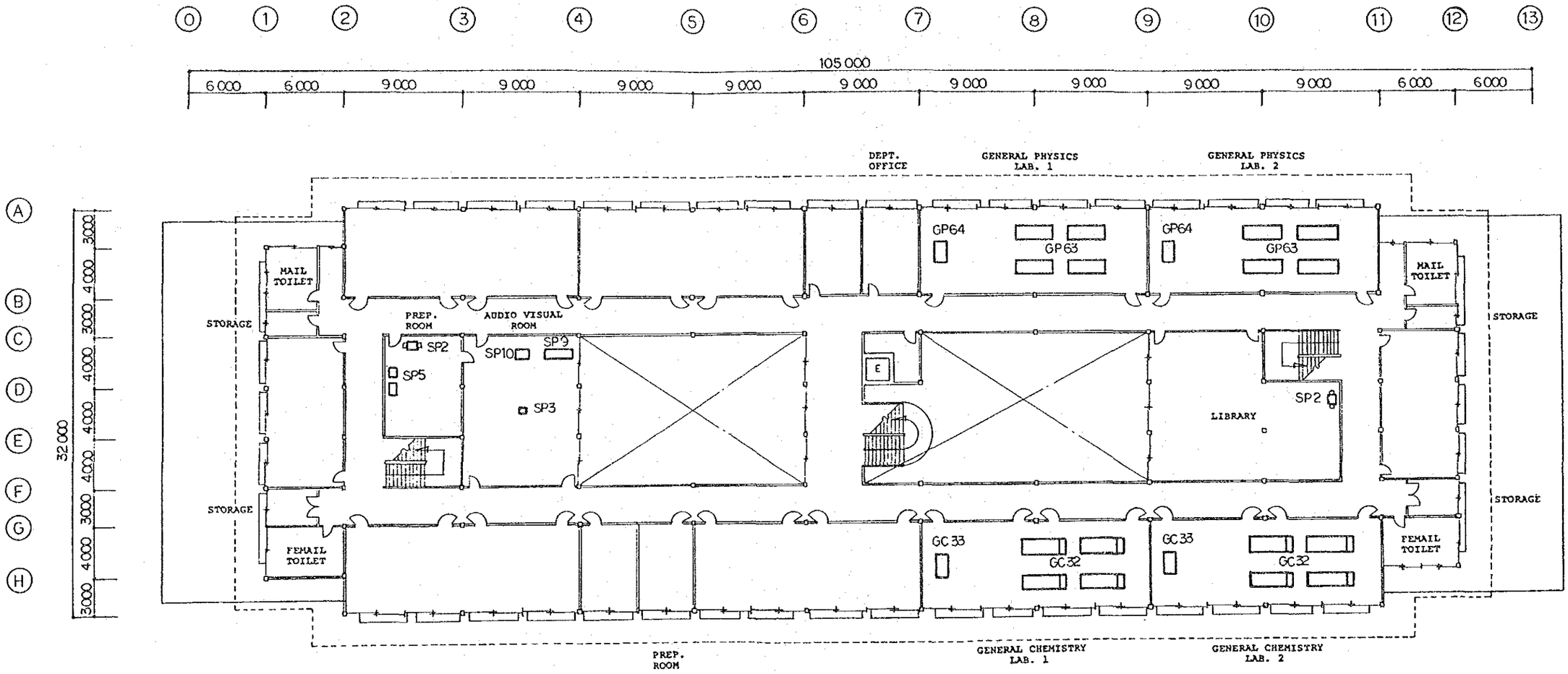
LAYOUT OF THE EQUIPMENT ON THE FIRST FLOOR



LAYOUT OF THE EQUIPMENT ON THE SECOND FLOOR



LAYOUT OF THE EQUIPMENT ON THE THIRD FLOOR



LAYOUT OF THE EQUIPMENT ON THE FOURTH FLOOR