Norwegian Embassy

LUANAR INFRASTRUCTURE DEVELOPMENT PROGRAMME (IDP)

PROGRESS REPORT FOR

JULY 2017 – JUNE 2018

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Acronyms and abbreviations

CRWB	Central Region Water Board
DoB	Department of Buildings
EDO	Estates and Development Officer
ESCOM	Electricity Supply Commission of Malawi
IAC	Infrastructure Advisory Committee
IDP	Infrastructure Development Programme
LCC	Lilongwe City Council
LUANAR	Lilongwe University of Agriculture and Natural Resources

Acknowledgements

Lilongwe University of Agriculture and Natural Resources (LUANAR) wishes to acknowledge the valuable financial support provided by the Government of the Royal Kingdom of Norway towards improvements to infrastructure development at LUANAR. Noteworthy, this support will allow LUANAR to realise some of its aspirations expounded in its Strategic Plan with respect to improved accommodation for female students and the creation of a conducive teaching and learning environment for both members of staff and students.

The University further acknowledges the continued technical and procedural guidance provided by the Directorate of Buildings (DoB) to ensure that the infrastructure is built according to laid out standards and within the specified time frames. The continued support of consultants and contractors is also highly appreciated.

Executive Summary

Lilongwe University of Agriculture and Natural Resources is coordinating the Infrastructure Development Programme (IDP) with funding from the Royal Kingdom of Norway since 2014. The IDP was developed to support the construction of a 212-bed hostel for female students, improvement of water supply system, upgrading of the existing sewerage system (which have since been completed and commissioned), and construction of teaching Complex B which is under construction. In addition, the IDP was further designed to support rehabilitation of existing teaching and learning facilities but this was suspended due to inadequate funds. The LUANAR Infrastructure Development Programme aims at widening access to university education by increasing classroom space, improving teaching and learning environment and improving accommodation especially challenges faced by female undergraduate students.

This report highlights the progress of the programme implementation and associated financial and income statements for the period, July 2017 to June 2018. During this period, the Programme activities included payment of the interim certificate for outstanding claims, final certificate and issuance of certificate of making good defects for the female hostel; payment of retention fee for the improvement of water supply component; payment of final certificate for the upgrading of the sewerage system and continuation of construction of the teaching and learning complex B. A summary of outputs achieved during the reporting period are as follows:

a) **212-Bed Female Students' Hostel:** This component was contracted to *Terrastone* Limited with the Director of Buildings (DoB) in the Ministry of Transport & Public Works as project managers. The works were completed, handed over and officially commissioned on 20th April 2017. During the reporting period, payment of the interim certificate for outstanding claims, final certificate and issuance of certificate of making good defects for the female hostel was done. In addition, final payment of furniture for the lounges and dining room was made within the period. In consultation with the Royal Norwegian Embassy, LUANAR Management also accepted to name the hostel "*Kristine Bonnevie Hostel*".

b) **Teaching and Learning Complex B:** Terrastone Limited is the contractor for this component and the project is also managed by the DoB in the Ministry of Transport *&* Public Works. The initial construction contract for the Teaching and Learning Complex B between LUANAR and Terrastone Limited was 110 weeks from 4th April 2016 to 30th June 2018. This construction period extended beyond the LUANAR Infrastructure Development Programme implementation period (November 2014 to December 2017) and a no-cost extension to May 2018 was approved by the Embassy.

As of June 2018, the general progress is at 65% and so far 87.2% of total amount have been paid to the contractor. The construction of works has not been completed due to delays of the soil investigation test which resulted in re-designing of the foundations and eventual delay on structural details from the Project Manager to the Contractor, re-routing of the medium voltage overhead power lines in the first year. During the reporting period, the project faced further delays due to erratic power supply which affected fabrication of the materials such as roof trusses, windows and door frames, and production of cement. Subsequently, the Project Managers granted an extension to the contract period to

26 September 2018 upon a request from the Contractor under the relevant clauses of the contract (Clause 28).

The Project Managers has advised LUANAR to consider unforeseen circumstances, for example worsening power outages, which may extend the completion of the project to December 2018.

c) **Improving Water Supply:** During the defects liability period, no defects were observed and the contractor was paid final retention fee.

d) **Sewerage system improvement:** The work was managed by Lilongwe City Council (LCC), and implemented by Shireco Limited. The contractor was paid the final payment certificate.

In general, the timeliness of IDP has been affected by delays in completion of Teaching Complex B. Nonetheless, the Programme delivery was cost-effective due to the involvement and collaboration among the key stakeholders including the Directorate of Buildings (DoB), Central Region water Board (CRWB), Lilongwe City Council (LCC), the contractor, attendant government ministries and departments and inputs and advice from the Infrastructure Advisory Committee (IAC). Worsening power outages remain the major risk although the contractor has sourced generators to supplement power supply.

Project results

- The student population at LUANAR Bunda Campus has increased by 3% from the baseline. This is below the target of 25% set by the programme.

- The student pass rate has not changed from its baseline value of 88% but within the gender groups the changes have been registered. The pass rate for female students has improved from 80% to 84%. Probably because more female students are now residing on campus.

- During the reporting period Bunda Campus did not register increase in teaching and learning space. This is because both teaching complex A and B have not been completed

- 50% increase in bed space has been recorded in the reporting period surpassing the programme target of 25%. This is due to commissioning of 212 bed “Kristine Bonnevie Girls Hostel” and others.

- Incidences of water borne diseases in the peak period (January to March) have reduced by 58%. The supplementary water supply system has increased water supply and reduced reliance on untreated water sources.

1.0 Introduction

Infrastructure Development Programme (IDP) was designed as a three year programme (November 2014 - December 2017). Although the programme was originally designed to conclude within the three years, it was extended to May 2018 to accommodate completion of the teaching complex B. The whole programme is worth NOK 65 million (US$10.8 million at exchange rate of NOK6/US$1 as at 2013); and is coordinated by the Lilongwe University of Agriculture and Natural Resources (LUANAR) with technical and policy support from the Directorate of Buildings (DoB) and Infrastructure Advisory Committee (IAC) respectively. Key stake holders for the programme are Directorate of Buildings, Central Region Water Board, Lilongwe City Assembly and LUANAR through the Project Coordination Office and the Estates Development Office (EDO).

The programme aims to improve teaching and learning infrastructure, improvement of living conditions of female undergraduate students and making a positive impact on the environment. It is envisaged that improved infrastructure will help in widening access to higher education in agriculture, human nutrition and food science, natural resource management and rural development.

As approved by the 2017 Annual IAC Meeting, activities carried out during the reporting period included continuation of the construction of the teaching and learning complex B, final payments for 212 female hostel, water components and the sewage system.

The aim of this report is to (i) provide a detailed progress of the programme between July 2017 to June 2018 based on the expected outputs as outlined in the Programme Agreement and agreed work plans; (ii) provide the level of achievement of indicators outlined in the programme agreement (ii) highlight expenses in the reporting period (July 2017 to June 2018) and provide tentative work plans and budgets for July to December 2018 period and to (iii) provide some of the anticipated risks and how these can be addressed.

2.0 Achievements of programme objectives and outputs

2.1 Programme outputs

The IDP agreement had four major outputs; 1) One hostel for female students, 2) Construction of teaching and learning facilities, 3) Rehabilitation of existing buildings, and 4) improved water and sanitation facilities. At the recommendation of the Infrastructure Advisory Committee (IAC) and following approval from the Royal Norwegian Embassy, rehabilitation activities were dropped from the programme. This section reports progress made in attaining the three remaining outputs.

2.1.1 Output 1: 212-Bed Female Students' Hostel

The female hostel works were completed, handed over and officially commissioned on 20th April 2017. During July 2017 to June 2018 period, three planned activities namely, payment of the interim certificate for outstanding claims, payment of final certificate and issuance of certificate of making good defects for the female hostel, and final payment of furniture for the lounges and dining room were fully achieved. In consultation with the Royal

Norwegian Embassy, the hostel was named Kristine Bonnevie Female Hostel in honour of the first female professor in Norway.

At the moment the hostel is fully occupied with 212 female students each paying K200, 000 (NOK 2,197) per year. So far the use of the facility has proceeded with no bottlenecks except for the low water pressure on the top floor of the structure. The University has already sourced funds to install booster pumps to remedy the situation.

2.1.2 Output 2: Teaching and Learning Complex B

Terrastone Limited is the contractor for this component and the project is also managed by the DoB in the Ministry of Transport & Public Works. The initial construction contract for the Teaching and Learning Complex B between LUANAR and Terrastone Limited was 110 weeks from 4th April 2016 to 30th June 2018. As of June 2018, the general progress is at 65% and so far 87.2% of total amount have been paid to the contractor.

During the reporting period, the contractor completed the following works superstructure, structural and concrete works, first fix for electrical and plumbing works, roof trusses installation, internal plastering on the ground floor, door frames installation on the ground floor, installation of ceilings in the ablution blocks on the ground floor, veranda flat roof, and plastering to first floor slab soffit works. Currently the contractor is working on joinery works (toilets), roof structure in terms of installation of rafters and purlins (in all blocks); internal plastering, (in all blocks); installing window frames and glazing (offices only); installing of ceilings (toilet blocks), applying floor finishes (administration block), installation of lifts, external finishes with respect to facing bricks and external works.

Figure 1: Construction of lift walls, roof rafters and purlins, veranda flat roof and external cladding

Figure 2: Installation of aluminium window frames and glazing

Figure 3: Installation of floor finishes

Figure 4: Installation of wall tiles, internal plaster and joinery in toilets

The construction works has not been completed due to delays in the soil investigation test which resulted in redesigning of the foundations and eventual delay on structural details from the Project Manager to the Contractor, re-routing of the medium voltage overhead power lines in the first year. During the reporting period, the project faced further delays due to erratic power supply which affected fabrication of the materials such as roof trusses, windows and door frames, and production of cement.

The contractor requested for an extension to the contract period according to General Conditions of Contract (GCC Clause 28.1) which stipulates that

"*The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost*".

Subsequently, the Project Managers granted an extension to the contract period to 26 September 2018 based on occurrence of a compensation event described under Clause 44.1(c)

"The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time"

The Project Managers have advised LUANAR that taking into account worsening power outages which affect the works (on-site and off-site) hence the expected date for completion should be 31 December 2018.

2.1.3 Output 3: Improved Water Supply and sanitation

During this period, the planned activity was payment of final retention fee which was done. The facility is being operated by CRWB that is meeting all operations and maintenance costs. On average, over 200 cubic litres of water are pumped into reservoirs and distributed to Bunda Campus and surrounding areas. Power outages are a major challenge as the board has to rely on a diesel generator that is expensive to run and sometimes pumping schedules are not adhered to. Nonetheless, the project has broad positive benefits to the community with "dry

tap" spells reducing drastically from days to mere hours. The water supplied from the station is also more palatable, without sediments and foul smell, compared to that from Kamuzu Dam.

LUANAR engaged Central Region Water Board (CRWB) to consider LUANAR to offset the investment cost. However, CRWB through the Ministry of Finance has indicated that the Act does not make provisions for subsidise rates or cost recovery for entities that invest in water systems because both, the university and water board, are government entities . However, CRWB pledged to explore ways of giving back to LUANAR especially under its Corporate Social Responsibility objectives.

The other component under this output is the Sewage System Improvement. The work was managed by Lilongwe City Council (LCC), and the contractor was Shireco Limited. During this period, the activity involved payment of final certificate. The system is now operational and the contractor was paid the final payment certificate. However, there is need to rehabilitate the remaining four (4) oxidation ponds for the system to work efficiently.

2.2 Programme Objectives (Results)

The programme goal is to widen access to higher education in agriculture, natural resources management and rural development through infrastructure development. Specifically the programme aims at enhancing human resource development relevant to agriculture, natural resources resulting in increased economic growth. Attainment of these objectives is measured using a number of indicators that we have discussed below.

2.2.1 25% increase in student population

During the reporting period, LUANAR Bunda campus had a total student population of 3,331 out of which 1,293 were female. This represents a 3% increase in total number of students from its baseline value of 3,228. Changes in respective gender groups were also observed. The female student population rose by 5% from 1,228 at baseline to 1,293 in the 2017/18 academic year while that of male students increased by the same percentage from 1,940 to 2,029 during the same period. Much as the student population has expanded, the project target of 25% increase has not been attained. Given that the estimated date of completion could be shifted to December 2018, the additional teaching space will enable LUANAR Bunda campus to increase its student population in 2019/2020 academic year.

2.2.2 25% increase in students pass rate

The student pass rate has not changed from its baseline value of 88% but within the gender groups the changes have been registered. The pass rate for female students has improved from 80% to 84%. Among the contributing factors is the availability of more bed space for female students on campus due to completion of the 212 bed hostel under IDP. Residing on campus accords students' better access to the university library, internet connection and student to student interaction.

2.2.3 35% Increase in teaching and learning space

During the reporting period Bunda Campus did not register increase in teaching and learning space. This is because both teaching complex A and B have not been completed.

2.2.4 25% Increase in bed space

At baseline a total of 951 bed spaces were available to accommodate undergraduate students. Out of these 467 were for female students and 484 for male students. As of June 2018, the number of bed spaces stood at 1,424 representing 50% increase surpassing the programme target of 25%. This increase has come about due to the commissioning of the 212 bed “Kristine Bonnevie Female Hostel”, 240 bed “Chilowa Hostels” and others. However, with the growing number of students accommodation still remains a challenge as the available bed space only carters for 43% of the student population.

2.2.5 75% Reduction in waterborne diseases

Data from Bunda Health Center, the main health services provider for student, staff and communities around Bunda Campus indicates that incidences of water borne diseases in the peak period (January to March) have reduced by 58%. A total of 108 cases of water borne diseases were treated at the facility from January to March 2015 against to 45 recorded same period in 2018. The Health Center Manager attributes this decline to improved water supply both on campus and surrounding areas. Since the commissioning of the supplementary water plant over 200 cubic litres of water are pumped and distributed daily and has greatly reduced outages that previously forced students and staff to draw water from unprotected sources. However, the target of 75% reduction is yet to be achieved. The target is likely to be attained once electric power situation in the country improves. As water pumping schedules will be adhered to eliminating outages thereby reducing use of water from untreated sources.

3.0 Risk Assessment

An important element of monitoring has been the risk assessment and management. This is for the risks that had been identified prior to the programme and some which have been new and emerging. Some of such risks have led to extension of project completion dates as alluded to earlier in this report.

3.1 Anticipated risks for the project included:

- Delayed delivery of the construction works due to power outages, erratic supply of construction materials like cement.
- Financial gaps (mainly on teaching and learning facility) for purchasing of laboratory equipment.

3.2 Current risks on the components

- Late completion of the works due to power outages.
- Late conclusion of permanent power connection by ESCOM which will be done after completion of all electrical installations.
- Fluctuations of exchange rates between NOK and US$
- Laboratory rooms have been plastered and services fixed hence the delays in specifications of fittings might result in costly additional works.

Despite the mentioned risks, contractor has been encouraged to do its best to finish within the reporting period.

4.0 Financial report

The programme budget was NOK65, 000, 000 (US$10M at a rate of NOK6= US$1) at the signing of the agreement between governments of Malawi and Norway though currently NOK has depreciated against the US$ (NOK6= US$1 to NOK8= US$1) (refer to Annex 1).

4.1 Resource Inflow

The planned budget for 2017/18 was NOK28, 805,566 (US$3,470,490). Total funds available for the reporting period were NOK23,142,361 (US$2,876,987). From the 2017/2018 budget the embassy released the first tranche of NOK15, 000,000 (US$1,895,854.40) representing 52% of the total budgeted funds. In addition there was balance brought down of NOK8, 097,447 (US$975,596) and interest accrued of NOK44,906 (US$5,537).

As at the reporting period of July 2017 to June 2018, MK1,698,225,664 (NOK18,654,393 equivalent of US$2,323,601) has been spent representing 64% of the budget and 81% of funds available. Table 2 below shows the funds paid under each component (see detailed budget on Annex 2).

Table 2: Income and expenditure for July 2017 to June 2018

INCOME	**MK**		**USD $**	
Balance b/d	710,845,657		975,596	
Grant from Norwegian Government	1,387,887,554		1,895,854	
Interest Receivable	4,014,367		5,537	
Miscellaneous income	1,000		1	
Total Income		**2,102,748,579**		**2,876,987**
EXPENDITURE				
Exchange loss	**469,169**		0	
Construction of 212 Bed Female Hostel	344,672,527		471,508	
Construction of Teaching & Learning Facilities	1,300,329,137		1,779,924	
Rehabilitation of Existing of Infrastructure	39,772,710		54,409	
Project Management & Coordination	12,982,121		17,759	
Total Expenditure		**1,698,225,664**		**2,323,601**
Unspent funds for the period		**404,522,915**		**553,387**

Represented By:				
Local Bank Account	35,744,275		48,898	
Forex Bank Account	368,778,640		504,489	
		404,522,915		**553,387**

5.0 Plan of activities for July 2018 to May 2019

5.1 Plan of activities for Teaching Complex B

The activities planned to be implemented from July 2018 to May 2019 are presented below.

Table 1: Work plans for retention payments on sewer upgrades

Component, Outputs and Activities	Sub Activities	NO-COST EXTENSION BUDGET (NOK)	NO-COST EXTENSION BUDGET US$	AUG 2018
Output : Final account and release of residue of retention	Payment of Final Account and release of residue of retention after expiry of defects liability period	23,256	2,802	
	Total	**23,256**	**2,802**	

Table 2: Work plans for construction of Teaching and Learning Complex B, Furniture and Procurement of Laboratory Equipment

Activity	Sub- Activity	NO-COST EXTENSION BUDGET	NO-COST EXTENSION BUDGET
		NOK	US $
Output 3 Teaching & Learning Facilities completed			
3.1 Construction of Teaching complex	Settle invoices for completion certificates	5,204,697	627,072
3.5 Procure furniture and equipment for teaching complex	Engage Suppliers to supply desks, chairs, tables, book shelves	768,298	92,566
Laboratory equipment	Engage Suppliers to supply laboratory equipment	7,738,113	932,303
Subtotal		**13,711,108**	**1,651,941**

Table 3: Work plans for Project Management & Coordination

Activity	Sub- Activity	NO-COST EXTENSION BUDGET	NO-COST EXTENSION BUDGET
		NOK	US $
Project Management & Coordination			
Conduct Programme Annual & Site Meetings	Conduct annual and site meetings	49,800	6,000
Facilitate DOB Supervision	Twice monthly site visits by DOB	40,463	4,875
Audit	Conduct Annual Audit	112,050	13,500
Bank Charges & Sundries	Pay monthly bank charges	33,200	4,000
End of Project Evaluation	Conduct Project Evaluation	249,000	30,000
Subtotal		**484,513**	**58,375**

NOTE : Exchange rate used is NOK8.3 / US$1

5.2 Request for approvals

1. With the current reflection of the programme budget, the programme is seeking the approval to carry forward balances and activities that were not implemented in Year 4 as follows:
    a) End of project evaluation
    b) Procurement of Furniture and Equipment for teaching complex

2. Use of accumulated interest since project inception totalling to NOK150,130 (US$18,088) to cushion the deficit on procurement of laboratory equipment.

3. Request for approval of the 2018/19 budget for smooth execution of the remaining works of the Programme.

6.0 Conclusion

The programme has successfully completed and commissioned the Kristine Bonnevie students hostel, the Water Improvement Project and Sewerline Improvement Project. Currently, the teaching complex B is at 52% completion. It is anticipated that the construction of teaching complex “B” is unlikely to be finished by May 2018 due to the risks and challenges alluded to above including power outages. However, the project team is working very hard to make sure that the project is completed within the stipulated period.

The output created by the project have started generating results increases in bed space and student pass rates have been recorded. In addition, the incidences of water borne diseases have been reduced. The completion of the teaching complex by December 2018 will likely result in the programme attaining it goal.

7.0 Way forward and recommendations

- The Royal Norwegian Embassy should consider extending the IDP implementation period to May 2019 to facilitate the completion of the teaching complex B.

- The DoB should ensure that all information is provided to the contractor on time to avoid further request for construction period extension by the contractor.

8.0 Annexes

Annex 1: 2018/19 Activities for construction of Teaching Complex B

Component, Outputs and Activities	Sub Activities	YEAR 4 BUDGET (MK)	YEAR 4 BUDGET (NOK)	JUNE 2018	JULY 2018	AUG 2018	SEP 2018	OCT 2018	NOV 2018	DEC 2018
Output 1.4 Internal & external walls	Block work for internal and external walls	1,350,140.00	15,699.30							
Output 1.5 Wall finishes	Plastering, painting, tiling walls and fixing facing bricks	2,520,010.00	29,302.44							
Output 1.6 Floor finishes	Screed and tiling floors	4,020,000.00	46,744.19							
Output 1.7 Ceiling finishes	Plastering underside of suspended floors and fixing of ceiling boards	3,500,250.00	40,700.58							
Output 1.8 Joinery fittings	Fixing of lecturer theatre seats, cabinets and shelves	40,655,687.35	472,740.55							
Output 1.9 Roofing	Installation of roof trusses and Harvey roof coverings	12,650,000.00	147,093.02							
Output 1.10 Windows and Doors	Installation of aluminium window and door frames	18,000,000.00	209,302.33							
Output 1.11 External works	Roads and carparks and drainage system	78,435,281.00	912,038.15							
Output 1.12 Installation of services	1st fix first floor and second floor (Electrical, plumbing and Firefighting)	35,600,250.00	413,956.40							
Output 1.13 Prime costs	Preliminaries, telephone installation, ESCOM capital contribution, Water capital contribution, landscape works	21,584,651.09	250,984.32							
Output 1.14 Retention	Release of half retention on practical completion and another half to be bonded by the contractor, the retention bond to be released after certification of making good defects	229,287,706.75	2,666,136.13							
	Total	**447,603,976.19**	**5,204,697.40**							

Annex 2: Revised IDP approved budget versus revised budgets

	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	Year 1 APPROVED BUDGET	Year 1 REVISED BUDGET	Year 2 APPROVED BUDGET	Year 2 REVISED BUDGET	Year 3 APPROVED BUDGET	Year 3 REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET
	US$		US$	US$	US$	US$	US$	US$	US$	US$	NOK	NOK
Output 1. Preliminary Works												
1.1 Produce revised Bills of Quantities (BoQs) for Hostel & Teaching complex	70,160	185,000	70,160	70,160	0	129,494	0	-	70,160	199,654	420,960	1,597,232
1.2 Conduct Environmental Impact Assessment at construction sites	18,000	40,000	18,000	18,000	-	22,000	-		18,000	40,000	108,000	320,000
1.3 Engage an Architect for supervision of construction	3,000	3,000	3,000	3,000	0	0	0		3,000	3,000	18,000	24,000
1.4 Tender for contractors	3,000	3,000	3,000	3,000	0	0	0		3,000	3,000	18,000	24,000
Subtotal	**94,160**	**231,000**	**94,160**	**94,160**	**0**	**151,494**	**0**		**94,160**	**245,654**	**564,960**	**1,965,232**
Output 2 Female Hostel Completed												
2.1 Engage contractor to construct 208 bed female hostel	2,486,712	2,486,712	1,492,027	379,605	621,678.00	1,511,011	373,007	596,096	2,486,712	2,486,711	14,920,272	19,893,690.64

	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	Year 1 APPROVED BUDGET	Year 1 REVISED BUDGET	Year 2 APPROVED BUDGET	Year 2 REVISED BUDGET	Year 3 APPROVED BUDGET	Year 3 REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET
	US$		US$	US$	US$	US$	US$	US$	US$	US$	NOK	NOK
2.2 Furnish Girls Hostel and Kitchen	263,868	263,868	0	0	0	0	263,868	263,868	263,868	263,868	1,583,208	2,110,944.00
Subtotal	**2,750,580**	**2,750,580**	**1,492,027**	**379,605**	**621,678**	**1,511,011**	**636,875**	**859,964**	**2,750,580**	**2,750,579**	**16,503,480**	**22,004,635**
Output 3 Teaching & Learning Facilities completed												
3.1 Engage quantity surveyor to review bills of quantities	0		0		0		0		-	-	-	
3.2 Produce revised Bills of Quantities (BoQs)	0		0		0		0		-	-	-	
3.3 Tender for contractors	0		0		0		0		-	-	-	
3.4 Engage contractor to construct the Teaching complex	6,280,580	5,510,000	3,768,348	3,306,000	1,507,339	1,091,470	1,004,893	621,710	6,280,580	5,019,180	37,683,477	40,153,436
3.5 Procure Furniture and Equipment for teaching complex	230,930	230,930	0	0	0	0	230,930	230,930	230,930	230,930	1,385,580	1,847,440
Subtotal	**6,511,510**	**5,740,930**	**3,768,348**	**3,306,000**	**1,507,339**	**1,091,470**	**1,235,823**	**852,640**	**6,511,510**	**5,250,110**	**39,069,057**	**42,000,876**
Output 4: Rehabilitation of Existing of Infrastructure completed												

	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	Year 1 APPROVED BUDGET	Year 1 REVISED BUDGET	Year 2 APPROVED BUDGET	Year 2 REVISED BUDGET	Year 3 APPROVED BUDGET	Year 3 REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET
	US$		US$	US$	US$	US$	US$	US$	US$	US$	NOK	NOK
4.1 Tender for contractors	3,000	0	3000	0	0		0		3,000	-	18,000	-
4.2 Engage contractor to upgrade water supply facilities at LUANAR	82,300	362,407	82,300	-	0	362,407	0		82,300	362,407	493,800	2,899,256
	5,000	-	5,000	-	0	0	0		5,000	-	30,000	-
	127,500	280,344	127,500	-	0	280,344	0		127,500	280,344	765,000	2,242,752
	5,000	88,941	5,000	-	0	88,941	0		5,000	88,941	30,000	711,528
	100,000	73,169	100,000	-	-	73,169	0		100,000	73,169	600,000	585,352
4.3 Engage contractor to upgrade Sewerage system at LUANAR	8,910	56,716	8,910	-	0	56716	0		8,910	56,716	53,460	453,728
	17,051	40,511	17,051	-	0	40511	0		17,051	40,511	102,306	324,088
	53,226	46,588	53,226	-	-	46,588	0		53,226	46,588	319,356	372,704
	75,020	38,486	75,020	-		38,486	0		75,020	38,486	450,120	307,888
	-	-	-		-		0		-	-	-	-
	-	-	-		-		0		-	-	-	-

	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	Year 1 APPROVED BUDGET	Year 1 REVISED BUDGET	Year 2 APPROVED BUDGET	Year 2 REVISED BUDGET	Year 3 APPROVED BUDGET	Year 3 REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET
	US$		US$	US$	US$	US$	US$	US$	US$	US$	NOK	NOK
4.4 Engage LUANAR Maintenance section to rehabilitate 2 Lecture theatres and 4 classrooms at LUANAR	41,421	-	41,421	-		-			41,421	-	248,526	-
4.5 Engage suppliers and contractor to rehabilitate existing laboratories at $140,636 LUANAR	140,636	0	140,636	0		0			140,636	-	843,816	-
Subtotal	**659,064**	**987,163**	**659,064**	**-**	**-**	**987,162**	**-**	**-**	**659,064**	**987,162**	**3,954,384**	**7,897,296**
Output 5. Equipment and Materials for Laboratories procured												
5.1 Prioritize Equipment needs for laboratories	30,000	20,000	0		30,000	20,000	0		30,000	20,000	180,000	160,000
5.2 Procure teaching complex lab equipment	576,519	576,519	0		576,519	-	0	502,574	576,519	502,574	3,459,114	4,020,592
Subtotal	**606,519**	**596,519**	**0**	**0**	**606,519**	**20,000**	**0**	**502,574**	**606,519**	**522,574**	**3,639,114**	**4,180,592**
Project Coordination & Management												

	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	Year 1 APPROVED BUDGET	Year 1 REVISED BUDGET	Year 2 APPROVED BUDGET	Year 2 REVISED BUDGET	Year 3 APPROVED BUDGET	Year 3 REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET	TOTAL APPROVED BUDGET	TOTAL REVISED BUDGET
	US$		US$	US$	US$	US$	US$	US$	US$	US$	NOK	NOK
Conduct Programme Annual & Site Meetings	28,500	28,500	9,500	9,500	9,500	9,500	9,500	9,500	28,500	28,500	171,000	228,000
Facilitate DOB Supervision of Hostel and Teaching Complex Construction	106,000	192,000	46,000	46,000	30,000	73,000	30,000	71,176	106,000	190,176	636,000	1,521,405
Facilitate Lilongwe City Council for Supervision Sewerage Improvement	0	18,000		0		18,000		0		18,000	-	144,000
Facilitate Central Region Water Board supervision of water supply upgrading and maintenance	0	0		0		18,000		0		18,000	-	144,000
Audit Fee	27,000	27,000	9,000	9,000	9,000	9,000	9,000	9,000	27,000	27,000	162,000	216,000
Bank Charges & Sundries	0	10,000	0	4,000	0	4,000	0	2,000	-	10,000	-	80,000
Programme Mid and End Evaluation	50,000	0	0		20,000	0	30,000	30,000	50,000	30,000	300,000	240,000
Subtotal	**211,500**	**275,500**	**64,500**	**68,500**	**68,500**	**131,500**	**78,500**	**121,676**	**211,500**	**321,676**	**1,269,000**	**2,573,405**
GRAND TOTAL	**10,833,333**	**10,581,692**	**6,078,099**	**3,848,265**	**2,804,036**	**3,892,637**	**1,951,198**	**2,336,853**	**10,833,333**	**10,077,754**	**64,999,995**	**80,622,036**

Annex 3: Detailed Expenditure for July 2017 to May 2018

	BUDGET		EXPENDITURE			BALANCE	
	NOK	US$	MK	NOK	US$	NOK	US$
Construction of 212 Bed Female Hostel							
Engage contractor to construct 212 bed female hostel	3,166,184	381,468	327,678,517	3,720,563	448,261	(554,379)	(66,793)
Furnish Girls Hostel	179,206	21,590	16,137,500	183,230	22,076	(4,024)	(485)
Subtotal	**3,345,390**	**403,058**	**343,816,017**	**3,903,793**	**470,337**	**(558,403)**	**(67,278)**
Construction of Teaching & Learning Facilities							
Engage contractor to construct the Teaching & Learning complex	22,736,680	2,739,359	1,113,190,091	12,648,486	1,523,914	10,088,194	1,215,445
Procure Furniture & Equipment for Teaching & Learning Complex	1,635,646	197,066	0	0	-	1,635,646	197,066
Subtotal	**24,372,326**	**2,936,425**	**1,113,190,091**	**12,648,486**	**1,523,914**	**11,723,840**	**1,412,511**
Rehabilitation of Existing of Infrastructure							

	BUDGET		EXPENDITURE			BALANCE	
	NOK	US$	MK	NOK	US$	NOK	US$
Engage contractor to upgrade Water system at LUANAR	211,791	25,517	17,186,455	195,140	23,511	16,651	2,006
Engage contractor to upgrade Sewerage system at LUANAR	258,705	31,109	22,586,255	256,451	30,898	2,254	272
Subtotal	**470,496**	**56,626**	**39,772,710**	**451,592**	**54,409**	**18,904**	**2,278**
Project Management & Coordination							
Conduct Programme Annual & Projects Site Meetings	49,800	6,000	1,316,200	14,945	1,801	34,855	4,199
Facilitate DOB & Other Government Institutions Supervision	80,925	9,750	2,098,250	23,824	2,870	57,101	6,880
Audit	204,429	24,630	5,273,800	59,880	7,215	144,549	17,415
Sundries & Bank Charges	33,200	4,000	1,022,976	11,615	1,399	21,585	2,601
End of Programme Evaluation	249,000	30,000	0	0	0	249,000	30,000
Subtotal	**617,354.00**	**74,380**	**9,711,226**	**110,264**	**13,285**	**507,090**	**61,095**
GRAND TOTAL	**28,805,566**	**3,470,489**	**1,506,490,047**	**17,114,135**	**2,061,944**	**11,691,431**	**1,408,606**

The Average Conversional Rate of MK731 to US$ has been used to convert Malawi Kwacha expenditures to US$ expenditures as at 29 May 2018

NOTES

1. The Financial year of July 2017 to May 2018 budget for the programme had projected a budget of NOK28,805,566 (US$ 3,470,490) and NOK 23,137,005(US$ 2,876,216) was made available as at May 2018 and NOK 17,114,135 (US$ 2,061,944) has been spent representing 59% of the budget and 74% of funds available.

2. The Over-expenditure on Hostel is due to final certificate number 15 which was expected to be paid before end of June 2017 but was submitted in July 2017 as such it was not included in the 2017/2018 budgets projections hence the over-expenditure though this has been covered with funds allocated under procurement of furniture & equipment for Teaching complex.

3. The three components under IDP namely construction of 212 bed Female Hostel and upgrading of the water and Sewerline systems have been finished, commissioned and handed over to LUANAR and they are operational

4. The Teaching Complex works are progressing well though is expected to finish beyond the estimated timeframe of May 2018

Annex 4: Summary of funds disbursed against budget highlighting shortfall for Laboratory Equipment

	Funding cycle	Date	Amount in NOK		Equivalent Amount in US$	Exchange rate
	Programme agreed budget			**65,000,000**		
1	Upon Agreement signing	December 2014	6,000,000		857,572.00	6.9965
2	First payment	September 2015	15,000,000		1,823,264.86	8.2270
3	Second payment	September 2016	18,000,000		2,202,777.95	8.1715
4	Third payment	June 2017	5,000,000		598,623.17	8.3525
5	Fourth payment	September 2017	15,000,000		1,895,854.40	7.9120
	Total Disbursed			**59,000,000**		
	Remaining from RNE			6,000,000		
	Available funds with LUANAR			6,258,200		
	Total available funds for the programme			**12,258,200**		
	Funds committed for Teaching Complex B		7,327,000			
	Office furniture & equipment		805,648			
	Total funds committed			**8,132,648**		
	Funds available for lab equipment		4,125,552			
	Estimated cost for lab equipment		8,013,793			
	Deficit on lab equipment			**3,888,241**		

Annex 4: List of Laboratory Equipment

CONSOLIDATION OF MAJOR EQUIPMENT ITEMS

Equipment Name	Biology	Biochemistry	Chemistry	Food and Nutrition	Anatomy (Vet)	Seed Lab	Physics	Compt. Lab	Total
HPLC	1	1	1	1		-	-		
GC	1	-	1	1		-			
Centrifuge	1	2	1	2	2	-			
Analytical Balance	1	2	2	3	1	2			
Balance	1	2	2	2	3	-			
Electrophoresis machine	1	4	-	1	1	-			
pH meter	2	3	5	2	3	4			
Spectrophotometer	1	-	1	1	1				
AAS	-	-	1	1					
Deep Freezer	1	1	-	1	1				
Refrigerator	1	1	1	1	2	1			
Drying oven	1	1	1	1	1	1			
Hotplate/ magnetic stirrer	5	5	5	3	3				
Glassware washer	1	1	1	1					
Incubators	1	1		1	1	1			
Water distiller	1	1	1	1	1				
Water Deioniser	-	1	1	1	1				
Waterbath	6	3	10	3	3				
Autoclave	1	1	-	1	1				
Furnace	1	-	1	1					
Protein analyser		1	1	1					
Fat analyser		1	1	1					
Laboratory Mill			1	1		1			
Microscope with camera	1	-	-	1					
Computers	2	2	2	2	2		4	102	
Microscope	101			100	80	20			
Glassware									
Beakers	200	300	300		300				
Measuring cylinders	20	100	100						
Conical flasks		300	300		300				
Volumetric flasks		300	300		300				

Testtubes		1000	1000		1000				
Homogeniser	1	1		1					
Moisture analyser	-	1	1	1		1			
Thermometers Mercury digital	10					100 20	20		
NMR gas spectroscopy									
Vortex mixer		5		3	2				
Push trolleys		2		2		6			
Freeze dryer		1		1					
Homogeniser	1	1		1					
PCR	1	1		1	1				
Spectrofluorometer		1							
Sonicator	-	1	-	1	1				
Fumehoods	2	2	4	2		-			
Shaker									
UV Visualiser (lamp)	1	1		1					
Block digester (protein)	-	1	2	2		-	-		
Amino acid analyser		1		1					
Biosafety cabinet	1	1			1				
Petri dishes	2 cartons				2 cartons				
Ice Maker			1	1					
Colony Counter	1			5	1				
Bomb Calorimeter			1	1					
Fiber Analyzer			1	1				4	
Laser pointers		4							
Uninterruptible Power Supply (UPS)		2			3			2	

BIOLOGY				
Item Name	**Description/specification**	**Quantity**	**Accessories**	**Manufacturer**
Autoclave	40 L capacity, top loading	1		
Glassware washer	standard	1		
Water distiller	standard	1		
Centrifuge	Up to 4000 rpm	1		

Analytical digital balance	With four decimal places	1		
Balance	Top loading, 200g maximum, 4 digit	1		
Furnace	Maximum temperature 1000°C	1		
Drying oven	Maximum temperature 200°C	1		
Deep Freezer	Minimumtemperature -80°C	1		
Incubator	Temperature range 5 to 80°C, 4 shelves	1		
Ice maker	standard	1		
Lamina flow	For microbial inoculation	1		
pH meter (Benchtop)	Oakton Bench top pH/conductivity TDS 510 meter	1		
Microscope (projection)	With inbuilt digital camera that can be connected to computer or projector	1		
Refrigerator	standard	1		
Stereo Microscope	Binocular	50		
Student Compound Microscope	Binocular	50		
Waterbath	100°C	6		
Bench microtome	standard	1		
Microscope slide dryer	standard	1		
Glass specimen jars	2L 5L	10 each		
Spirit burners	standard	20		
Inoculating loops		10		
Magnetic stirrer/hot plate		5	Bullets	
Counting chamber		2		
Bunsen burners		30		
PCR Thermocycler		1		
Gas Chromatography (GC)		1		
High Pressure Liquid Chromatography (HPLC)		1		
Thin Layer Chromatography (TLC)		1		
Electrophoresis				
Colony counter				
pH meter		2		
UV-VIS Spectrophotometer		1		
Scalpels				
Homogeniser				
Thermometers				

Petri dishes				
Erlenmeyer flasks	Narrow neck			
Erlenmeyer flasks	Broad neck			
Test tubes				
Test tube racks				
Pipettes				
Pipettes tips				
Pipettes racks				
Membrane filtration apparatus				

BIOCHEMISTRY					
ITEM No.	**Item Name**	**Description/specification**	**Quantity**	**Accessories**	**Manufacturer**
1	High Performace Liquid Chromatography (HPLC)	For protein and pesticides analysis UV-detector (multiwavelength:190-600nm) Gradient pumping Valve injection	1	Columns(reverse phase) UPS	Agilent 1220 Infinity II LC
2	Electrophoresis machine (DNA analysis):Horizontal Agarose gel	Universal power supply, 300V Mini Cell Wide Cell	2	Casting cassettes, combs	Bio Rad
3	Electrophoresis machine (Protein analysis):Vertical SDS gel	Universal power supply, 300V Chamber	2	Casting cassettes, combs	Bio Rad MiniProtean
4	Centrifuge	Cooling to 4°C Swing rotors 10000 rpm Bench top	2	Rotors tubes	
5	Analytical balance	Weighing 60-200g Readability 0.0001g (0.1 mg)	2		Metler Toledo

		Stability ≤ 5 s			
6	Balance	Weighing up to 210g Readability 0.001g (1 mg) Stability ≤ 5 s	3		Metler Toledo
7	Water distiller	4-12 L/hour Conductivity ≤3 □S 3 KW	1		
8	Cell Disruptor (Homogeniser)	Volume sample: 2-10.5 ml Pressure: 30 kPsi (2000 bar) Power: 0.75 KW	1	Cooling unit	Constant Systems
9	Freezer upright	Volume: 16 Cu.Ft Temp, range -9 t0 -26°C Ice maker included Fast freeze, frost free alarm	1	Power regulator	Electrolux or Whirlpool
10	Incubator	Temp. Range 30-70°C Optimization to 37°C Volume 450x450x450mm Double door, acrylic transparent Circulating fan Microprocessor digital controller	1		
11	Image Analyzer (Darkbox)	Benchtop darkbox To capture:chemi-luminescent, fluorescent and chemifluorescent Gel size up to 25 x 25 cm	1		Fujifilm Luminescent
12	Shaker	Single tier orbital shaker Temp. 0-60°C Shaking Speed: 0- 400 rpm Shaking motion orbital Platform size: 420 x 420mm Temp.control micro controller	1		
13	Spectrofluorometer	Detector High Sensitivity Photomultiplier Spectral range:200 to 900 Band width: 2, 5, 10 and 20 selectable Readability: 0,1 nm Accuracy: ±2 nm	1		ELICO SL 174
14	Amino acid analyzer	Analysis time: approx 30 mins Reproducibility Ret.time CV 3% Reproducibility peak area CV 1% Detection limit:3 pmol	1	UPS	

		Pump: 0-20 MPs Flow rate: 0-999 ml/min Autosampler			
15	Waterbath (general purpose) Waterbath (Ciculating)	Heating: 200W Volume: 2L bath Dimensions: 230 x 199 x 233mm Digital control, monochrome LCD Heating: 1500W Volume: 35L bath Dimensions: 305 x 692 x 192mm Digital control, monochrome LCD	2 1		Thermo Fischer Scientific
16	Vacuum pump	Type: dual stage Ultimate vacuum: 2 x 10^{-3} mbar Pumping speed: 410L/min Gas ballast: yes Ultimate vacuum w/gas ballast: 1 x10^{-2} mbar	2		Agilent Technologies
17	pH Meter pH Meter(general use)	pH and conductivity-dual channel pH range -2 to 20 pH accuracy:0.002 Temp range:-30 to 130°C pH range 0 to 14 3 stage calibration pH resolution:0.1/0.01 pH Temp compensation: from 0 to 100°C with ATC Digital display: readability 0.001 pH units Supply electrode plus standard buffers (pH14, 7 and 4)	1 2	electrodes Electrode holder	Mettler Toledo (S470 Seven Excellecy)
18	Polymerase Chain Reaction Machine (PCR)	Detector CCD Tungsten-Halogen lamp 96 wells 10-50□l tubes Ramp temp/time 3.3 °C /s heating and 2.0 °C/s cooling Peltier block heating and cooling method	1	10- 50 □l tubes 5 packets each	
19	Voltex Mixers	Speed: 100 to 2000 rpm Operating modes: mixing and voltexing	5		

		Dimensions: 10 x 7 x 9 in			
20	Microwave	Counter top oven 1200 watt 24 in	1		
21	Pipettes (glass)	Various volumes:1, 5, 10, 25, 50 ml	150 each		
22	Laboratory Retort stands and clamps set Lifting platform Lab Jack	Retort base: 200 x 125 mm Retort clamp: 260 x 85 mm Clamp with rubber jaws and 3 prongs 10 x 10 cm platform	25 5		
23	Glassware Washer (Dish washer)	Cleaning-rotary direct injection Temp. Up to 93°C Multitronic controller Interchangeable baskets (WxDxH: 24 x 24 x 34 in)	1		Miele Professional Products
24	Ultrasonic bath	Power -1000 watts Frequency- 33 ±3 KHz Micro controller, Auto degassing, LED display, Stainless steel housing	1		Analab Scientif Inst Ltd
25	Conical flasks	Borosilicate Transparent 250 and 500 ml 1000 and 5000 ml	 100 each 10 each		
26	Measuring cylinders	Borosilicate Transparent 10, 50 and 100 250, 500 ml and 1000 ml	 100 each 10 each		
27	Beakers	Borosilicate Transparent 50, 100 and 250 ml 500 and 1000 ml	 100 each 10 each		
28	Bunsen burners	Nickel plated brass tubing 12 mm diameter, suitable for natural gas, base 70mm diam, 145 mm height	20		
29	Filtration columns	Diam x height: 2.6 x 60 cm	 10 each		

		2.6 x 30 cm			
30	Ni-NTA columns	Volume:5 ml Chelating agent: NTA Format: 5 ml FPLC Flow rate: 5 ml/min Temp: 4- 8°C Technology: IMAC	20	Resin slurry	Protino NTA columns
31	Dialysis tubing	Membrane type: symmetric regenerated cellulose tubing Physical prop: transparent, flexible pH limits: 2-12 Temp.: 60°C Organic solvent tolerance: good MWCO: 6-8 kD and 12-14 kD	5 box each		Spectra/Por
32	Blotting machine	Semi dry blotting systems Blotting area 24 x 16 cm Dimensions 37 x 24 x 11 cm	1	Blotting paper	Trans Blot SD (BioRad)
33	Freeze Dryer	5 Temp. Controller shelves Shelf temp. -40°C to 60°C Ice condenser temp. -55°C Ice condenser capacity 18L Fully automated touch screen, data logging, pressure control	1		Mechatech systems (LyoDry Maxi
34	Micropippet Eppendorf	10 □l 50 □□ □□□ □l 1000 □l	5 each	Disposable tips	
35	Push Trolleys	Metal, twin deck, 100 cm x 60 cm	2		
36	Column matrix	Sephadex LH-20 Sephadex G-25 medium Sephacryl-S1000 SF	500 g 500 g 750 ml		
37	UV Transilluminator (DNA visualiser)	View area: 20 x 20 cm Wavelength 312 Dual band units Built hinged UV safety screen	1	Face shield	
38	ICE MAKER	Harvest rate:3 kg/hr	1		
39	Reagent Bottles	Bottles with PBTB, screw cap, silico gasket with PTFE Heat resistant up to 140°C			Bohemia

		Color: White Volume: 100, 250, 500, 1000 ml Color: amber Volume: 100, 250, 500	100 each 50 each		
40	Glass Petri dishes	Soda-lime Color: transparent Dimensions: 15 x 100mm 20 x 100 mm 20 x 120 mm	20 each		
41	Fumehoods		4		
42	Moisture analyser		1		
43	Computers	For Data analysis, Visual Displays. HP Compaq DC5800 Desktop Intel Core 2 Duo 2.4GHz 4GB RAM 750GB HDD DVD Windows 10 Home 19" Monitor, Keyboard, Mouse, Speaker WiFi	2		
44	Laser pointer	**18K Gold Laser Pointer** • Size: 22*2.4 cm • Laser Type: Direct Diode • Beam Divergence: 3.6mRad Weight:0.36kg	2		
45	**Uninterruptible Power Supply (UPS)**	• Model Name APC Smart-UPS RT 10000VA 230V • Output Power Capacity 8000 Watts / 10.0 Kva • Output Power Capacity 8000 Watts / 10.0 kVA • Max Configurable Power (Watts) 8000 Watts / 10.0 kVA • Nominal Output Voltage 230V • Output Voltage Note Configurable for 220 : 230 or 240 nominal output voltage • Output Voltage Distortion Less than 3%	4		

		• Output Frequency (sync to mains) 50/60 Hz +/- 3 Hz user adjustable +/- 0.1 • Crest Factor Double Conversion Online • Output Connections AT LEAST (1) Hard Wire 3-wire (H N + G) (Battery Backup) , (4) IEC 320 C13 (Battery Backup) , (4) IEC 320			
46	Air conditioners		3		

CHEMISTRY						
Item No	**Item**	**Specifications**	**QYT**	**Accessories**	**Qty**	**Manufacturer**
1	High Performance Liquid Chromatography (HPLC)	For protein and pesticides analysis UV-detector (multiwavelength:190-600nm) Gradient pumping Valve injection	1			
2	Gas Chromatography (GC)	Flame Ionisation Detector Gases:Acetylene/air Lipid analysis	1	Columns Nitrogen generator		Agilent
3	Microwave Plasma-Atomic Emission spectrophotometer	Runs on air instead of combustible gases Detector: Hermetically-sealed, UV-sensitive, back-thinned solid state CCD detector (532 x 128 pixels) Wavelength range 178–780 nm	1			Agilent Technologies (Agilent 4210)
4	Steam distillation unit Kjeldahl semi-Automatic	Measuring range: 0.2 to 200 mg Nitrogen Nitrogen recovery: >99.5% Distillation speed: 35 -40 Typical distillation time: 7 – 10 miutes Water consumption rate: from 80 – 100 litres/hr Steam generator water consumption: 2.5 Litres/hr Water reservoir for steam generator: 6 Litres NaOH reservoir: 2 Litres	1			J. P. SELECTA

		Boric acid reservoir: 2 Litres				
5	Digestion block unit	Macro bloc digest Capacity to store 20 programs of 4 steps for temperature and time Number of positions: 20	1	Scrubber unit	2	J. P. SELECTA (Bloc Digest 20 Part no 4000631)
	Fiber analyzer	Integral extraction and filtration Number of places: 6 Sample size: 0.5 to 3 grams Measuring range: 0.1 to 100% Cooling water consumption: 1 ltre/minute	1			J. P. SELECTA
6	Solvent recovery extractor for fats and oils (For Soxhlet method)	Cellulose extraction thimbles: 26×60mm Reusable glass thimbles: 34×80mm	1 box 1 box			J. P. SELECTA
7	Ultraviolet and visible range Spectrophotometer	Optical system: Double beam optics. Wavelength range: 190 to 1100 nm Band path: 1.5 nm Wavelength accuracy: ±0.3 nm Light source: Deuterium D2 and Halogen lamps Voltage: 110-220V	1	i. Flow cell 10 mm path length ii. Software UV-Analyst Spectrum	5 1	J. P SELECTA (Model UV-2300 II)
8	Muffle Furnace	Carbolite muffle furnace AAF 11/7 4 sided heating Maximum temperature: 1100^{o}C Maximum amps: 16 Volume: 7 Litres Heating power: 2624W Maximum power: 4000W	1			Carbolite
9	Upright freezer	Capacity: 513 L Temperature range: -14^{o}C to -25^{o}C	1			
	Refrigerated cabinet	Capacity: 236 L Temperature controllable from 2^{o}c to 40^{o}c with a stability of ±1.5oC and a resolution 1^{o}C Number shelves: 3	1			
10	Deionizer					

	Water distiller	Distillation capacity: 4 Litres/hr Water supply(consumption): 1 litre/minute Power supply: 300 W	1			
11	Centrifuge	Digital microprocessor controlled centrifuge				
12	Laboratory multifunctional grinding mill	Made of stainless steel Capacity: 10 a 30 Db: 85 Rpm: 4200 Measures (cm): Height/ Width/ Depth of 70, 40, 80.	1	i. 1mm sieve ii. 0.25 mm sieve	1 1	J. P. SELECTA
13	High capacity Macro Rotatory Evaporator	Rotatory speed: 0 to 120 rpm. Bath temperature: up to 200^{o}C	1	Vacuum pump		J.P. Selecta
	Water recirculation vacuum pump					
14	Melting point machine	Automatic Digital LD display: Numeric Temperature range: from 50^{o}C to 300^{o}C				
15	Disk Polarimeter	Vernier reading definition. Angle ±0.05^{o} Measuring range of optical rotation: ±180^{o} Measuring lens: 4×				
	Digital portable refractometer	Portable and easy to use Al[phanumeric display Automatic temperature compensation (ATC) TO 20 ^{o}C with sasmple temperature range from 5 to 40^{o}C Temperature selection: ^{o}C or ^{o}F Power supply: 9V battery				
16	Magnetic stirrer with Heating	For 5 positions Individual speed control for each position Height/ width/ depth (exterior) 16, 28, 35 cm. Depth/ width (plate): 25 cm by 25 cm Max temperature: 300 ^{o}C Max stir volume: 600 mL Speed: up to 1600 rpm Heater power: 680W Weight: 12 Kg	1	Box of 17 assorted stir bars Stir-bar retriever	1 2	
17	Rocking mixer “Vibromatic”	Digital electronic control of speed and time Oscillations per minute: 100 – 950 Oscillation amplitude: 8 mm	1	Platform support with Dimensions 38 cm long X 19 cm Weight: 2 Kg	1	

		Easily detachable arms equipped with 8 clamps that allow all types of tubes and flasks with diameter 5 to 50 mm to be held in position. Maximum capacity (load): 4 Kg Height/ width/ depth: 23 cm, 77 cm, 27 cm Power: 34W Weight: 11 Kg		Capacity: 8 Erlenmeyer flasks of capacity 250 mL		
	Vortex mixer					
17	Water bath	Digital control and display of temperature and time. Adjustable temperature range from ambient +5^{o}C up to 99.9 ^{o}C, stability ±1 ^{o}C Programmable temperature and time. Capacity: 20 L Height/ width/ depth (usable): 15, 48, 30 cm Height/ width/ depth (exterior): 20, 58, 42 cm Power: 1500W, Weight: 10 Kg	10	i. Lid with concentric rings: 6 places ii. Support frame for tube racks iii. Tube racks with dimensions: Height/ width/ depth (usable) of 8cm by 8.2 cm by 23.6 cm.	10 10 50	
	Sand bath					
	Fume cupboards	Anti-acid continuous ceramic workshop with anti-dumping and evacuation sink Assembly system with two bodies: Upper body with cabinet and embedded extractor and Lower body with a structure, ceramic workshop and remote control panel for fluids and gasses in a horizontal housing Lighting level: more than 500 Lux in working area. Upper body Height/width/ depth (exterior): 170, 172,90cm Lower body Height/width/ depth (exterior): 90, 172,90cm Upper body Height/width/ depth (inner): 120, 146, 62cm	4			

		Lower body Height/width/ depth (exterior): 72, 146,55cm				
	Drying oven	Natural convection Capacity: 80 Litres Shelf positions: 8 Adjustable temperature from ambient +5oC up to 250oC	2			
	Analytical balance	Digital 7 segment screen Maximum weight capacity: 200 g Readability 0.0001g (0.1 mg) Stability ≤ 5 s	2			COMECTA/ METTLER TOLEDO
	Homogenizer					
	Pipette washer					
	Push Trolley	Metal, twin desk, 100 cm × 60 cm	2			
	Infra red spectroscopy	For structure determination	1			

FOOD AND NUTRITION LAB				
Item Name	**Description/specification**	**Quantity**	**Accessories**	**Manufacturer**
Moisture analyser	Determining moisture content of food raw materials in order to project yield, evaluate product quality and shelf life both in the lab and pilot plant	1		
Incubator	Drying food samples at controlled temperature, incubating cultures etc	3		
Rapid viscose-analyser (RVA)	For determining the viscosity of gel food substances	1		
Gel electrophoresis	This will be used to separate mixtures of DNA, RNA or proteins molecules according to molecular size pushed by an electrical field	1		
Food wet mill	This will be used for the grinding of wet applications for particle size reduction with high dispersion	1		
Vortex mixer	The machines will be for mixing the samples before analysis	3		
Microscope with a camera	For viewing the food molecules aggregation in a reaction	1		
Light box				
Sonicator	This will be used for agitating particles in food samples for extracton purposes	1		

Centrifugal mill	Provides high performance grinding and dispersion of dry samples to achieve a nano-level grinding and dispersion performance	1		
Freeze dryer	For storage of samples to maintain sample physiochemical properties	1		
Fridge	Storage of samples reagents and final products	4		
Homogeniser	For complete mixing of samples	1		
Fume hood	Providing safety through creating laminar air flow to suck out the fumes from samples out of the laboratory projector	4		
Sohxlet apparatus	For fat extraction	1 unit		
Hot plate/magnetic stirrer	For drying samples or speeding the reactions	3		
Fat analyser	For fat analysis	1		
Water deioniser	For purifying water	1		
Water distiller	For demineralisation of water	1		
Evaporator	For separation of substances based on difference in evaporation point	1		
Centrifuge	For concentrating sediments before separation	1		
Micro-centrifuge	For concentrating sediments using capillary tubes before separation	1		
Waterbath -shaking	Incubating samples at monitored fluid temperature	3		
Bag mixer	De-foaming or degassing food materials.	1		
UV-VIS Spectrophotometer	Most important analytical instrument in modern day laboratory used to determine concentration of nutrients (proteins, sugars, iron etc) in food samples	1		
Atomic absorption spectroscopy	This will be used to measure the concentration of food nutrients.	1		
Kjeltron (food protein analyser)	For quantifying protein levels in foods	1		
Autoclave	To sterilize solvents and media to avoid contamination of food products in the course of processing and to avoid growth of normal floras on the media	1		
High Pressure Liquid Chromatography (HPLC)	This will be used for analysing food micronutrients for monitoring purposes to check compliance to good manufacturing standards so as not to jeopardise safety or health and for monitoring pesticide contamination levels in the foods	1		
Washer	Cleaning of reusable laboratory personal protective attires	1		

Analytical balance	Precise measuring of samples and reagents mass	3		
NMR gas chromatography	For determining the bioactive compound in food particles	1		
Muffle furnace	For ashing	2		
Protein digester	For releasing the nitrogenous compounds	2		
Gas Chromatography (GC)		1		
Balance		2		
pH Meter		3		
Deep Freezer		1		
Drying Oven		1		
Computer	desktop	2		
Mixroscope		100		
Push Trolleys		2		
PCR machine		1		
Amino Acid Analyzer		1		
UV Visualizer		1		
Gel Camera Imager		1		
Ice maker		1		
Colony Counter		5		
Test Tube racks		50		
Bomb Calorimeter		1		
Eppendoff fuge (microfuge)				
Fiber Analyzer		1		

SEED SCIENCE				
Item Name	**Description/specification**	**Quantity**	**Accessories**	**Model**
Head lamps		9		Apex
Drying Oven	1.2 x 2 x 0.8 m	1		Gallenkamp
Seed divider	centrifugal	2		
Seed divider	Conical	2		
Laboratory Mill		2		Perten 3310
Analytical Balance	0.01-250g	2		Adam

Analytical Balance	0.1 – 4100g	8		Ohaus
Dissecting Microscope		20		Wagtech
Sampling spear, Nobble Trier	20 mm	4		
Sampling spear, Nobble Trier	15 mm	4		
Seed counter		2		Indosaw
Germination table		2		Wagtech
Cooled incubator		1		LMS
Seed germinator		2		Caltan
Soil sterilizer	100 L	1		Wagtech
Refrigerator		1		Lec
pH meter	pH 1- pH 14	4		Eutech
Humidifier		1		Descator
Mercury Thermometer		100		
Digital Thermometer		20		Hygrothermo
Moisture meter		5		
Pushing trolleys		6		
Germination containers	30 x 20 x 10 cm	200		

PHYSICS: MECHANICS				
Item Name	**Description/specification**	**Quantity**	**Accessories**	**Manufacturer**
Force boards, wooden	610 x 485 mm, with bench mounting brackets using G-clamps	8		
G-clamp (Bench Clamp)	100 mm jaw	16		
Roll of cord for use with heavy loads		10		
Centre rings for use with cord	Pack 10	10		

Pulleys (single, double and triple)	50 mm diameter, fitted with clamps for mounting on force board	16 each		
Force Spring Scales	5N	16		
Spring balances	1-100N	16 each type		
Masses set	10g to 250g, 500g, 1000g, 5000g	16		
Young's Modulus Apparatus	Comprises a scale plate carrying a 0 to 30mm scale, and a moveable vernier readable to 0.1mm. Both have bars with clamping screws for the wires and hooks for the tension weight and loading masses. A ceiling clamp is provided for the upper ends of the wires, together with a pair of large woodscrews for attaching it to a convenient overhead beam, door frame etc. A tension weight, mass 1.3kg approx, for the comparison wire is also included.	8		
Hooke's Law- Dynamometer		8		
Dynamics system	kit, comprising track, trolley (2), pulley, mass pieces, ticker timer, cotton reels, ticker tape reels, carbon discs, housed in suitable wooden/plastic/metal box.	10		
Linear air-track, catapult arm with slots for elastic bands at each end of track.	Fine adjustment of level of track possible, 3 vehicles, buffer attachment	10		
Dual/single timer with segmented millisecond timer display(s), stop/start on single timer mode, dual stop/start, gated,		10		
Blower, air track	adjustable speed, complete with hose for connecting to air track above, mains 230 V	1		

“g” by free-fall apparatus	consisting of release mechanism suitable for use with electronic timing device	9		
Charle's Law Beaker type		8		
PHYSICS: MEASUREMENTS				
Boyle's law apparatus	with Bourdon gauge, calibrated, complete with oil, pump and pressure tubing	10		
Micrometer screw gauge	0.25 mm x 0.01 mm	10		
Vernier callipers	0-120 mm x 0.1 mm with roller wheel adjustment and locking screw	10		
Thermometer	digital, range **–**50 ºC to 200 ºC (approximately), hand held	10		
Thermometer	platinum resistance, enclosed in glass tube, platinum wire non-inductively wound on mica frame, leads connected to top of thermometer (one unit)	10		
Thermocouple	copper-constantan, single with 0.5 m leads for connection to galvanometer.	10		
Thermistor	mounted on 1 m leads terminating in 2 x 4 mm plugs, suitable for use in liquids	10		
Thermometer	ungraduated, non-roll, red spirit-filled, range –10 to 110 ºC	10		
HEAT				
Calorimeter	Joule, 4 V, 3 A. Complete with stirrer, terminals and heating coil, lagged and fitted with outer jacket, lid with hole for thermometer	8		
Calorimeter	metal block, 2 holes, to accept heater and thermometer, aluminium, 1 kg	8		
Immersion heater	12 V, suitable for use with metal block calorimeter	8		
Steam trap, all glass		8		
LIGHT AND OPTICS				
Fibre optic probe	consisting of a bundle of non-coherent optic fibres, up to 300 mm long	10		

Filters, infrared and ultraviolet, set		10		
Glass block, optical quality, rectangular for refraction experiments	Approximate size 100 x 62 x 18 mm .	10		
Glass block, optical quality, semi-circular for refraction experiments	Approximate size 90 x 18 mm (diameter x thickness). Polished on all sides.	10		
Block, acrylic plastic (clear) for refraction experiments	19 mm thick, rectangular, 75 x 50 mm sides	10		
Laser	0.5- 0.7 mW approximate output power	10		
Set of accessories for laser	to include tapered slit, metal gauge 300 mesh, two polaroid filters, grating, hologram, set of slides with 1, 2, 3, 4, 5, 6 slits having slit separation of approx. 0.25 mm	10		
Lens, biconcave	optically worked glass with ground edge, 50 mm diameter. Focal length 150 mm.	20		
Lens, biconvex	optically worked glass with ground edge, 50 mm diameter. Focal length 150 mm	20		
Lens holder	wooden, to suit the lenses	10		
Light source	compact, with tungsten halide 12 V, 100 W lamp for use on 12 V a.c. or d.c. supply.	10		
Mirror, concave	optically worked, back silvered, protective coating, 50 mm diameter. Focal length 150 mm	20		
Mirror, convex	optically worked, back silvered, protective coating, 50 mm diameter. Focal length 150 mm	20		
Optical set	complete with light box operating from a 12 V a.c./d.c., 3 A power supply. The set comprises 3 different prisms, semi-circular and rectangular slabs, two bi-convex and one bi-concave lenses, plane, half round and parabolic mirrors, slits, bulb, colour filters and cards	8		
Optical bench	working length 1 m – 1.5 m approximately, graduated, with at least four saddles (at least two capable of fine traverse movement), levelling screws, lamp house and light source 12 V/24 W	8		
Set of accessories for optical bench	to include: 2 lens holder; 1 mirror holder ; 1 mounted needle; 2 optical pins; 1 pinhole screen; 1 cross wire; 1 prism table; 1 diaphragm with adjustable iris; 1 object screen; 1 receiving screen	8		

Photocell	selenium, mounted with connection for 4 mm plugs	8		
Prism, glass	60/60/60º, 50 x 50 mm sides	8		
Prism, glass	90/60/30º, 40 x 40 mm sides	8		
Prism, glass	90/45/45º, 50 x 50 mm sides	8		
Spectrometer	suitable for student use, graduated in 30 minute increments, two Verniers, 180 degrees apart, Collimeter, with c.178 mm rack and pinion focusing aperture, 25 mm diameter, variable slit, levelling screws. Prism table, diameter c.86 mm (height adjustable and lockable). Telescope, with c.178 mm rack and pinion focusing aperture, diameter 25 mm, Ramsden eyepiece. Flint prism, prism clamp, diffraction grating holder, cross line graticule, Vernier magnifier. Complete unit in packing case.	8		
Spectral lamp	sodium, suitable for use with spectrometer	8		
Spectral transformer and lamp house		8		
Solar energy kit	comprising solar cells, motor, fan, on stand	8		
Ultraviolet lamp	hand-held, suitable for school use, dual wavelength, 254/366 nm, tubes 8 W, complete with stand	8		
UV protective spectacles		24		
ENERGY CONVERSION WAVES/SOUND				
Ripple tank with power supply unit	illumination, motor stroboscope and accessories	8		
Wave motion apparatus	“Haig” or equivalent, to demonstrate transverse and longitudinal wave motion	8		
Sonometer	Movable bridges, two wire pattern. Wire fitted to spring balance and wrest pin with key to adjust tension	8		

Slinky Spring		8		
Sound level meter, digital	Low scale/ high scale, complete with microphone	8		
Tuning forks, pair, mounted on resonance boxes	Frequency 426.6 Hz. One fitted with adjustable load mass	16		
Resonance tubes	comprising two glass tubes, diameter 32 mm (closed at one end) and 25 mm respectively. Length 305 mm. Smaller tube slides within the inner tube on foam plastic collars	16		
Microphone	frequency response 100 – 10 000 Hz, hand held with BNC connection for use with oscilloscope	8		
ELECTRICITY AND ELECTRONICS				
Dynamo, hand-driven	to demonstrate a.c. and d.c.	8		
Electrostatics kit	EHT Power Unit suitable for electrostatics experiments and for driving vacuum devices such as the Deflection e/m Tube. Continuously variable, 0 - 5kV at a maximum current of 2mA. Second output with 50MΩ safety resistor. Auxillary output, 6.3V a.c. at 1A. Digital, back-lit display indicating EHT output voltage. Sockets suitable for standard 4mm plugs or shrouded plugs.The adjustable 5kV output is fully isolated and a backlit, digital meter displays the output voltage. .	8		
EHT supply	EHT Power Unit suitable for electrostatics experiments and for driving vacuum devices such as the Deflection e/m Tube. Continuously variable, 0 - 5kV at a maximum current of 2mA. Second output with 50MΩ safety resistor. Auxillary output, 6.3V a.c. at 1A. Digital, back-lit display indicating EHT output voltage. Sockets suitable for standard 4mm plugs or shrouded plugs.The adjustable 5kV output is fully isolated and a backlit, digital meter displays the output voltage.			

Electronics kit to investigate semiconductors and basic electronics (or Ohm's Law Experimental Kit)	mounted components with 4 mm electrical connection sockets, with test leads and batteries	8		
Galvanometer, spot	general purpose, sensitivity (direct) in the range 22 mm/μA, 2 mm/μV, 70 mm/μC, double reflecting optical system, electrical overload protection	8		
Induction coil	to give 50 mm spark minimum, 8 V d.c., complete with on/off switch and two 4 mm sockets	8		
Leaf electroscope	100 x 60 x 140 mm approx. with a selection of rods and cloths to produce positive and negative charge	8		
Magnetic field demonstrator (Magnaprobe)	to show 3-dimensional magnetic field, comprising of perspex box with 10 mm diameter tunnel extending through the centre, can be used on OHP	16		
Transformer kit	demountable, suitable for student demonstrations. The kit should be capable of demonstrating the structure and principle of operation of transformers and some of their uses. Tapped coils with a range of coils of different numbers of turns, for example 50, 100, 200 turns.	16		
Van de Graaff generator	Collecting sphere diameter 270 mm approximately. Driven by electric motor 230 V, 50 Hz. Output up to 400 000 V	8		
Conductors	set of 3, on insulated pillars on metal base comprising of sphere 50 mm diameter, cylinder 125 x 50 mm, cone 100 x 50 height x base diameter, for use with Van de Graaff generator	8		
Accessories for Van de Graaff generator, set	ending in 4 mm plug, to include: Insulating rod with suspended conducting sphere Needle point discharger Rotary discharge whirl Head of hair Neon bulb on holder Insulated cylinder with conductive vibrative particles.	8		
Proof plane	13 mm diameter approximately, on insulating handle	16		
Capacitor 10 000 μF	Mounted and fitted with 4 mm sockets	24		
Parallel plate capacitor	with moveable plates to show effect of area, distance between plates and material between plates on capacitance	8		

Metre bridge	4 gap, mounted on rigid PVC, with Constantan wire c.0.56 mm diameter, electrical connections via 4 mm sockets, scale graduated 0 – 100 cm x 1 mm and 100 to 0 cm x 1 mm. Complete with knife edge jockey.			
Resistors (or assorted set)	1Ω, 3Ω, 5Ω, 10Ω, 50Ω, 100Ω, 500Ω, 1000Ω	8		
Circuit board worcester RTL		16		
Multi Test Meter Digital		16		
Ammeters	1A, 2A, 5A and 10 A	10 each		
Voltmeters	1V, 2V, 5V, 10V	10 each		
Galvanometers	1A, 2A, 5A and 10 A	10 each		
Rheostat	not more than 2000Ω	16		
Dual Voltmeter/Ammeter	5V/5A to 100V/100A	16		
Digital multimeter	20 amp range.Backlit display with 25 mm digits Soft rubber boot for drop protection.Built-in tilt stand.Type K thermometer built in for surface or air measurements.Auto power off saves battery life	8		
Joulemeter/Wattmeter	low voltage d.c. or a.c. of any waveform, up to 10 kHz. Joulemeter, up to 8 digit display, max. load 20 V d.c./14 V a.c., maximum load current, 10 A d.c./7 A a.c., frequency range d.c. to 10 kHz. Wattmeter, moving coil meter display, maximum power 100 W, frequency range d.c. up to 10 kHz.	8		
Oscilloscope	dual trace, 20 MHz bandwidth, 8 x 10 cm screen with scale illumination, adapters to take 4 mm plugs	8		
Oscilloscope	(cathode ray) simulation/ demonstration on CD Rom	8		

Tube, cathode ray	demonstration type, in storage case, Teltron or equivalent, to include integrator for attachment to oscilloscope to enable display of characteristic curves	8		
Universal stand		8		
Signal generator and amplifier	frequency range 0.1 Hz – 100 kHz sine and square wave output. High and low impedance output and amplifier input, power gain 56 dB	8		
ATOMIC (NUCLEAR) PHYSICS				
Geiger-Muller tube	suitable for classroom use	8		
Holder and stand	suitable for use with Geiger-Muller tube	8		
Scaler/ratemeter/timer	for Geiger-Muller tube	8		
Radioactive source kit	set of 3 source types- e.g. alpha (Po-210), beta (Sr-90) and gamma (Co-60) - embedded in colour coded epoxy material, safe for use in classroom. No source to exceed 1.2 µCi. To include holder for sources and a range of items needed for demonstration of the differing absorption/ penetration powers and the effect of magnetic field on the three types of radiation. Suitable for use with equipment	8		
"Radioactive" source, electronic, simulated, allows determination of "half-life", random numbers and Poisson distribution curve	powered 12 V a.c./d.c.	8		
MISCELLANEOUS				
Demonstration software to simulate Rutherford's Experiment				

Charts	**Set of Physics Charts** (SI units) with portable tripod. Size approximately 100 x 75 mm coloured, Welch or equivalent, to illustrate the following:• Electromagnetic sprectrum; • Optical instruments; • Semi-conductor devices; • Ionizing radiation detectors; • Motor and d.c. generator (dynamo)			
Laboratory Burner		16		
Beaker	1000 ml, plastic	16		
Measuring cylinder	500 ml, plastic	16		
Azlon conical flask with cap (plastic), 250ml	250 ml, plastic	16		
Safety googles		30		
Rulers	1m	16		
Retort stand bases	200x125mm,250x160mm	16 each		
Mild steel rods	750x12.5mm, 1000x12.5mm	16 each		
Digital USB microscope		16		
TI-30X IIS Solar Calculator		8		
Digital Physics Bundle	Enables a wide rage of physics experiments to be logged, analysed and presented. It consists of: Acquire Data Logger, AcquireD software, Digital Sensors of Force, Acceleration, Current, Light, Pressure, Sound, Temperature, Voltage. Includes Digital Light Gate sensor	8		
Crocodile crips, conecting wires	4mm plug, 150cm,75cm,50cm,25cm,15cm 32A. Red, Black, Blue, Green	32		
Gas Laws and Pressure Discovery Pack		8		

Pyrex beakers	100ml, 250 ml	10 each		
Wonder folding ladder, Aluminium Gravity	used for roof mountings. Positive l steel hinges. Height extends to 3.4m. Safety maximum load 100kg	1		
Desktop Computer (Lab)	For Data analysis, Visual Displays. HP Compaq DC5800 Desktop Intel Core 2 Duo 2.4GHz 4GB RAM 750GB HDD DVD Windows 10 Home 19" Monitor, Keyboard, Mouse, Speaker WiFi	4		
loudspeaker	A 75mm diameter, circular loudspeaker of 8Ω resistance.Contains a high flux ceramic magnet of nominal power rating 5W.Mounted in a rectangular plastic case and with two 4mm sockets for connection. Despite its relatively small size this unit will provide a useful level of sound over the whole audio frequency range.Dimensions: 150 x 135 x 40mm.	10		
vacum pump	With large oil capacity of 350ml provides for long operation between oil changes. The oil level site glass is incorporated so that the oil can be monitored. Ultimate vacuum is 25 microm.Dimensions 330 x 135 255. Weight 9.8kg. Air displacement 40Lt\Min.	4		
vacuum glass jar	A 90mm radius acrylic tube houses a battery-operated, high output piezo sounder. Vacuum pump not included. Volume 5L	10		
polystyrene	Easily cut with knife or scissors. Score and fold to make models and boxes. Use a non-water based glue to stick items to surface. Available in 2 sheet sizes: 305 x 305 x 3mm or 520 x 760 x 4.5mm and 3 pack sizes.	16		
gold leaf eletroscope	A metal case with 4 mm earthing socket with glass window. A metal disc passes through an insulating polythene bush and ends in a flat support for “gold leaf” with a transparent scale to show quantum of deflection.Includes two gold leaf sheets, fitted with 4mm socket. Assembled, the electroscope measures 165 x 95 x 70mm.	10		
capacitor componets (carbon and electrolyte)	2000nF,240V, 470uF,10uF,2200uF,1000uF. Or set capacitor set containing capacitors in F, uF, nF, pF.	4 sets for each		
Decade Capacitance Box	For resonance timing, wave shaping, and oscillator experiments. Accuracy ± 5%. Voltage range 63 V. 1 - 10 µfd in steps of 1 µfd.	10		

capacitance Substitution boxes	The Capacitor Box uses 1 rotary dial with 12 steps. Various capacitors are selected one by one. Useful for general purpose electronic work. The unit has an easily selectable range of 12 preferred capacitors from 100 pF to 1 mFd. The individual values are 100 pF, 220 pF, 470 pF, 2.2 nF, 4.7 nF, 10 nF, 22 nF, 47 nF, 100 nF, 220 nF, 470 nF and 1mFd. All values of + 5% Accuracy and of 63V ratings.	10		
electrodes:Nickel,Carbon,Iron, Chrome-nickel, copper and zinc	(Carbon Electrodes:100mm rods to be used with Hoffmans Voltameter carbon electrodes.Size:100mm.Pack size: 50) d-3mm. Others same sizes	2 sets for each		
current balance apparatus	Includes: Iron Yoke (holds magnets) Removable Magnets (6) Six Conductors (1, 2, 3, 4, 6 and 8 cm in length) Mount (for holding/positioning conductors) Six conductors of different lengths are provided and can be easily changed while maintaining a repeatable position with respect to the magnetic field. The magnetic field is proportional to the number of magnets used.	8		
soldering iron Kit	Antex soldering kit which includes CS18W soldering iron with silicone rubber cable and 13A mains plug, bench stand, starter pack of solder and “how to solder” booklet.	8		
Soldering Rework Station	8586 Soldering and Hot Air Gun 2 in 1	2		
solder wire	guage: 18,22 and 26	1 kg for each		
Solder Sucker	With disoldering vacuum ability	8		
polar graph papers (Set)	A3 size. With angle marking in Degrees Celcius. White in Colour	50		
Digital stopwatches	**UNILAB DIGITAL STOPWATCH**:Large 12mm high display.Timing features include start/stop and reset via the top-mounted push switches or via the front panel 4mm sockets.The stopclock can time up to 1 hour in 1/100 second with split (lap) timing if required. It is powered by two AA/R6 or HP7 cells which	10		

	give many months of use. If light gates are to be used, the Centisecond Timer Module provides extra facilities1/100s. **FASTIME1 STOPWATCH** - Black - Pack of 10 Pack of ten: 24 hour stopwatch with time/calendar display and alarm. Takes cumulative split times with time out and 1-2 fast finish. Shock resistant. Battery included.Black			
Motion Trolley	Designed to provide a smooth, flat, easily inclinable surface for dynamics experiments using trolleys.With metal side rails and plastic feet.Dimensions: 2.4 x 0.3m	10		
ticker-tape timer	The unit comes with a boss-head so that it can be easily clamped in a rod. Requires 2-4V AC from a low-voltage power supply. The unit is protected by a 2A internal fuse. Uses self-marking paper tape. Self marking tape is not included.'	10		
Paper Tape	16mm wide. Spare paper tape for the Ticker tape timer with holder and tape (B8R06431) and the Ticker Timer (B8R06037).	50		
hydrometer	The specific gravity 60/60°F scale compares the relative density of a given liquid with that of water, at 60°F (15.6°C).Material: Soda glass, Steel shot ballast, Synthetic wax resin.Range: 0.200 S60/60°F.Accuracy: 0.004 S60/60°F.Divisions: 0.002 S60/60°F.Overall Length: 250mm.Bulb Diameter: 18 - 20mm.Approx Weight: 42g (including 11g protective plastic tube).	10		
bunsen burner	Nickel-plated burner tube with rotatable air regulator and a cylindrical riffled connector, mounted on an enamelled pressed-steel base. Burner tube: 100 x 13mm, height x diameter, base: 80mm diameter. Overall height: 140mm, connector: 10mm. Comes as a Pack of 10.	16		
Funnels Set, Polythene	Set of 3 funnels with diameters of 75 mm, 95 mm and 120 mm, made from flexible yet strong polythene.	7 sets		
Lascells Resolved Forces Board	A board with attachment points that can be put in line for collinear forces where the single force is the sum of the other two. For 2D work, angles and vectors can be easily examined. The durable	10		

	white plastic-coated board measures 800 x 450mm and comes complete with balances and full instructions.			
S-Range Digicounter	A versatile counter suitable for timing, frequency, period and radioactivity measurement. A built-in high stability crystal controlled oscillator ensures a typical accuracy of 0.005% on all measuring ranges. The period measurement and display function enables very low frequencies to be measured rapidly with a high degree of accuracy. It also allows triggered timing of trolley speeds (etc.) to be performed using a single light gate; and by shorting the period input, infinite radioactivity or frequency counts may be obtained.Inputs: E.H.T BNC connector for a G.M. tube. Supply voltage adjustable from 300 to 500V.Counting time: 1, 10, 100 or 1000 seconds and infinity. Can be set to take a single or a continuous series of readings, each being displayed for 3 seconds before the next is taken	4		
Thermopile detactor	Omega 0562-MVC. Include stand and Cable	4		
Precision Spring Balance	In transparent plastic tube with engraved graduated scale. Protection against overload and with an adjuster to set to zero. Each capacity is colour coded for ease of identification. Comes as a pack of ten.1Kg/10N,	4 sets		
Spring Balance	Spring Balance, Rectangular Plastic Body (Newton Meters) - 0 to 10N x 0.1N. 1N and 2.5N,10N,50N,100N, 200N	30		
lens	focal length: +20mm, +50mm, +100mm, +300mm, -200mm, -50mm	10 each		

COMPUTER LABORATORY					
ITEM NO.	**ITEM NAME**	**QTY**	**BRAND**	**SPECIFICATIONS**	**ACCESSORIES**
1	**Air conditioners**	4			
2	**Laser Printers**	2		**HP LaserJet Pro 500 color MFP M570dn** • Functions: Print, copy, scan, fax	• Power Cable • USB Cable

				• Paper size: at least A3 • First page out (ready) color: As fast as 10.5 sec • Resolution (black): Up to 600 x 600 dpi • Resolution (color): Up to 600 x 600 dpi • Resolution technology: HP ImageREt 3600 • Print Technology: Laser • Display: 3.5" (8.89 cm) touchscreen, LCD (color graphics) • Ports:1 Hi-Speed USB 2.0; 1 Host USB; 1 Gigabit 10/100/1000T Ethernet; 2 RJ-11 • Network ready: Standard (built-in Gigabit 10/100/1000T Ethernet) • Memory, standard: 2 Gigabytes • Duplex printing: Automatic (standard)	• Installation CD
3	**Flatbed Scanner**	2	HP	**HP Scanjet 300 Flatbed Photo Scanner** • Max Supported Document Size: 8.5 in x 11.7 in • Supported Document Type: Plain paper, photo • Document Feeder Type: Manual • Interface: USB 2.0 • Optical Resolution: 4800 dpi x 4800 dpi • Document Size Class: A4/Letter • Image Resolution 200 dpi	• USB Cable • Power cable • Installation CD
4	**Laser Pointer**	4		**18K Gold Laser Pointer** • Size: 22*2.4 cm • Laser Type: Direct Diode • Beam Divergence: 3.6mRad • Weight:0.36kg	

5	**Projectors**	2		**BenQ MX528** • Brightness (ANSI lumens): 3300 • Display Color: 30 Bits (1,07 billion colors) • Light Source Wattage: 196W • Zoom Ratio:1.1X • Lens: F = 2.56 ~ 2.68 • f = 22.04 ~ 24.14 mm • Image Size: 30"~300" • Speaker: 2W x 1 • Dimensions (W x H x D) (mm): 283 x 95 x 222	• Universal Ceiling Mount • 3D Glasses
6	**PowerPoint remote**	4		**2.4GHz Wireless Remote-Control Presenter Presentation USB Laser Pointer Receiver Transmitter:** • Battery Type: 1x AAA battery (Not included) • Effective RF Communication Range: 10 meters Max • Power Consumption: 30mA max • Dimension: Approx. 10.5cm x 4cm x 2.5cm/ 4.13" x 1.57" x 1" • Interface: USB 1.1/2.0 • Power: USB Bus Power 5V DC	
7	**Electronic Graphic pads**	4		• Size:358mm*210mm • Thickness:0.7cm • Material:PVC • Interface type:USB • Active Area: atleast 10" x 6" • Accuracy:±0.01" • Resolution:5080 LPI (Lines Per Inch) • Report Rate:230 RPS • Pressure Sensitivity:2048 Levels	• Digital Stylus Pen • Tips Hold • USB Cable
8	**a. Teaching Graphics Tablet**	4		**a. Cintiq 27QHD** • Product Type Creative pen and touch display • Size 770 x 465 x 54.5 mm • Screen Size (Measured Diagonally) 68.6 cm • 27 inch • Multi-Touch	• USB Cable • Installation CD • Charger

				• Pen Pro Pen • Type Pressure-sensitive, cordless, battery-free • Resolution 5080 lpi	
	b. Lecturer's Teaching Aid	2		**Microsoft Surface Pro 12.3" Multi touch Tablet** 2.6 Ghz Intel core i5 8 Gb RAM 256 SSD 12.3 pixel sense 10-point touch display	• With Dock • Mouse • Cover • Power supply
9	**Computers** **HP 20" ProOne 400 G3 All-In-One Multi-Touch Desktop Computer**	102	HP	• 2.9 GHz Intel Pentium G4560T i7 • 8GB of 2400 MHz DDR4 RAM • 20" HD+ LED-Backlit TN Touchscreen • 1600 x 900 Screen Resolution • Integrated Intel HD Graphics 610 • 1 TB 7200 rpm SATA 2.5" Hard Drive • Slim SuperMulti DVD | SD Card Reader • 802.11ac Wi-Fi & Bluetooth 4.2 • USB 3.0 | USB 2.0 | DisplayPort • Windows 10 Pro (64-Bit)	
10	**Electronic Teaching Board**	2		**Interactive SMART Board 7075** • Up to 10 simultaneous touch, writing and erase points. • Type LED • Aspect ratio: 16:9 • Optimal resolution:3840 × 2160 at 60 Hz • Pixel dimensions: 0.429 mm × 0.429 mm • Audio: 10 W integrated speakers (×2)	• power cable • USB cable • Pen (×4) • Eraser
11	**Tablet Writing Lcd Digital Drawing**	4		• Material: ABS+ Electronic Parts • Input Pressure: 10~20 GInput Voltage: AC 36V • Frequency: 1Hz • Size: 28x18.5x0.5cm • Power supply: 1 x CR2016 button battery • Weight: About 180g	• Pen • CR2016 button battery • Writing Tablet Case
12	**Uninterruptible Power Supply (UPS)**	2		• Model Name APC Smart-UPS RT 10000VA 230V • Output Power Capacity 8000 Watts / 10.0 Kva • Output Power Capacity 8000 Watts / 10.0 kVA • Max Configurable Power (Watts) 8000 Watts / 10.0 kVA	• CD with software , • Service Manual

				• Nominal Output Voltage 230V • Output Voltage Note Configurable for 220 : 230 or 240 nominal output voltage • Output Voltage Distortion Less than 3% • Output Frequency (sync to mains) 50/60 Hz +/- 3 Hz user adjustable +/- 0.1 • Crest Factor Double Conversion Online • Output Connections AT LEAST (1) Hard Wire 3-wire (H N + G) (Battery Backup) , (4) IEC 320 C13 (Battery Backup) , (4) IEC 320 • C19 (Battery Backup) , (6) IEC Jumpers (Battery Backup)	• Smart UPS signalling RS-232 cable • Web/SNMP • Management Card
13	**Table Microphones**	52		• Gooseneck Tabletop Microphone, 6” or 12” • Polar Pattern: Cardioid • Battery : \ 2 AA Rechargeable (NiMH) • Frequency Response: 100Hz - 20,000Hz • Signal Noise Ratio: 70dB@1Khz 94dB SPL	
14	**Web cameras**	102			
15	**Teaching Collar Microphones**	4			
16	**Ceiling Speakers**	8			

LIST OF EQUIPMENT AND INSTRUMENTS

DEPARTMENT OF PATHOLOGY

SR. NO	NAME OF THE ARTICLE	AVAILABLE
1	Rotary Microtomes	2
2	Cryostat (Leica - CM15055)	1
3	Hot plates	2
4	Hot air (50 degree Celsus) for special staining	2
5	Paraffin embedding bath (Ordinary)	1
6	Distilled water still	1
7	Water bath 57 degree Celsius	1
8	Rectangular water bath	2
9	Centrifuge machine electric Rotofix	2
10	Colorimeter Photoelectric Klett.	1
11	Cabinet for 1000 slides	10
12	Band saw	1
13	Autopsy tables	1
14	Automatic tissue processor, Histokinmettee or similar, complete (Leica Make)	1
15	Staining racks for staining in bulk	35
16	Troughs for staining in bulk	24
17	Coplin jars	24
18	Water bath electric (Tissue Floatation	2
19	Balance, Chemical with weights	3
20	Microscopes, Monocular, with double nose piece, High power objective 2 eye-pieces, mechanical stage and condensor	62
21	Oil immersion lens for above	62
22	Polarising attachments for microscopes	1
23	Magnifying lens	6
24	Blood pressure instrument	2
25	Hot plat electric	2
26	Laboratory Counter nine keys clay Adams	6
27	Automatic timer	3
28	Balance for weighing organs	1

29	Saws, wire for cutting bones	1
30	Slide boxes for 100 slides for students	120
31	Microphotographic apparatus	1
32	X-ray viewing box	2
33	Double Demonstration Eye piece	1
34	Microprojection apparatus	2
35	Sternal puncture needle Adulet size	2
36	Sternal puncture needle child size	2
37	Liver Biopsy needle	2
38	Stop watch reading at 1/5 second.	6
39	pH Meter electronic	2
40	Microscope, Binocular, research.	1
41	Paper Electrophoresis apparatus vertical	1
42	Paper electrophoresis apparatus, horizontal	1
43	Museum jars.	450
44	Drawing instruments & colour for artist	1 set
45	Surgical instruments.	1 set

HISTOPATHOLOGY

SR. NO	NAME OF THE ARTICLE	MAKE
1	Trinocular Reasearch Microscope Model BX - 41 with SLR Digital Camera with grabber card attachment for storage transfer and simultaneous imaging	Olympus
2	E 330 Digital camera compatible with BX - 41 and CX - 31	Olympus
3	Tissue Embedding centre with cold plate	Leica
4	E Z - Retriever system V.2	Bio-Genex
5	Automatic Knife Sharpener	Leica
6	Hot Air Oven (18 x 18 x 18)	Pathak
7	Microtome Knife	Lieca & yorco
8	Single Pan Electronic Balance	Citizen
9	Kitchen Balance	Citizen
10	Gas Stove with Cylinder	Surya
11	Computer	HP
12	Printer - Laser 1020	HP
13	Bone Decalcifier	Yorco
14	Block Cabinet (Capacity - 10000)	Yorco
15	Refrigerator 210 Lit Capacity double door	Whirlpool
16	Slide Carrying tray	Yorco
17	Blood cell counter - 9 units (clay -Adams type	Yorco
18	Electronic Digital Timer	Citizen
19	Lumber Puncture Needles	
20	Binocular Microscope	Olympus Magnus

CLINICAL LABORATORY

SR. NO	NAME OF THE ARTICLE	MAKE
1	Microscope high power with oil immersion lens moveable stage and condensor for the routine microscope work.	13
2	Bottles Sp Gravity 25 cc	2
3	microburretes 5 cc	2
4	Incubator	1
5	Haemacytometers with red and white pipettes	70
6	Haemoglobinometers, Sahili'type	70
7	Sedimentation apparatus-one wester green and one wintrobole	sets each
8	Syringes disposable one set from 10 cc to 2cc 30 of each	Adequate
9	Staining jars for slides.	12
10	Urinometers	18
11	Urine Glasset (Conical)	75
12	Centrifuge tubes graduated	36
13	Crucible with china ltd.	3
14	Crucible Gooch with adapter	3
15	Graduated cylinders for various capacities ranging from 100 cc to 1000 cc. .	of each
16	Pipettes of various sizes, graduated sets	Available
17	Reagent bottles.	Available
18	Dropping bottles	Available
19	Dropping bottles 4 ounce	Available
20	Reagents	Available
21	Balances 1) Sensitive balance	2
22	Chemical balance with weight boxes	1

CENTRAL CILINICAL LABORATORY (Pathology)

SR. NO	NAME OF THE ARTICLE	MAKE
1	Electronic Semi - Automatic cell Counter	MAC
2	Cell Counter (Fully Automatic)	Beckman Counter
3	Single Pan Electronic Balance	Citizen
4	Refrigerator 210 Lit Capacity double door	L.G. Make
5	Cutter for disposing of Syringe and needle destroyer	MAC
6	Rotator (Blood Sample Mixer)	Techno Fab
7	Computer with UPS	IBM / HP
8	UPS - 3 KV	APC
9	Printer Dot Matrix	EPSON
10	Gas Stove with Cylinder	Surya

SPECIAL HAEMATOLOGY

SR. NO	NAME OF THE ARTICLE	MAKE
1	Electrophoresis Unit	Bioera
2	Coagulation Analyser	Tranasia
3	Microscope	Olympus
4	Water Bath	Lab Hos
5	Mixer Cyclo	Remi
6	Spectrophotometer	Systronics