THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN

PHARMACY COUNCIL

Pharmacy Council of Tanzania

CURRICULUM FOR

TECHNICIAN CERTIFICATE

(NTA LEVEL 5)

IN

PHARMACEUTICAL SCIENCES

Approved by the Council on	29th May, 2015
Valid for five (5) years until	28th May, 2020
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Pharmacy Council of Tanzania, P. O. Box 31818, DAR ES SALAAM.	National Council for Technical Education, P. O. Box 7109, DAR-ES-SALAAM.	

NATIONAL COUNCIL FOR TECHNICAL EDUCATION * P. O. BOX 7109 * DAR ES SALAAM *

FOREWORD

One of the statutory functions of the Council as stipulated in Section 5 (10 (e) of the National Council for Technical Education (NACTE) Act (No. 9 of 1997) is to "establish and make awards in technical education and training which are consistent in standard and comparable to related awards in Tanzania and internationally".

The Council has defined and established a range of National Technical Awards (NTA) to be conferred on graduates of technical education and training institutions upon successful completion of their respective studies in various technical fields. The NTA are competence/outcomes based defined according to specific levels of achievement and designed to testify that the holder of the award possesses the requisite competences necessary to apply competently in the relevant occupational sector. Competence in this case refers to the ability to successfully carry out some occupational activity and it is described in terms of skills, knowledge and understanding.

The NTA framework is intended to provide clear and accurate information about the purposes and outcomes of technical education and training, in a form that will be useful to stakeholders. Each technical education and training qualification/award is pegged to a level in the qualifications framework and has a competence descriptor.

The Council has in place procedures which guide technical institutions, authorities or other interested parties to develop curricula. The procedures for curriculum development, review and validation requires an institution wishing to develop a curriculum to carry out Situational Analysis, set or adopt standards and use the same to structure the curriculum. After development of a curriculum, the institution is required to consult its stakeholders to ascertain both the information gathered through situational analysis and the curriculum. A complete submission for validation ought to include the Curriculum Information Report, Situational Analysis Report and Opinion of Stakeholders. This curriculum is validated by the Council because the institution fulfilled all the NACTE requirements for curriculum development, validation and approval.

After this approval, the institution is allowed to make small corrections, if any, during implementation. However, major changes ought to be made during review, which should take place within five years. The institution is also required, before implementing the curriculum, to facilitate the orientation of all teaching staff on CBET curriculum delivery to and ensure adherence to assessment guidelines throughout the training process.

As indicated on the cover page, this curriculum is valid for five years and it should not be used after the indicated validity date.

Dr. A.B. Rutayuga
Ag. EXECUTIVE SECRETARY

NATIONAL COUNCIL FOR TECHNICAL EDUCATION
P. O. BOX 7109
* DAR ES SALAAM *

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LIST OF ABBREVIATIONS

SLF	=	Saint Luke Foundation
NTA	=	National Technical Award
NACTE	=	National Council for Technical Education
MUHAS	=	Muhimbili University of Health and Allied Science
RuCU	=	Ruaha Catholic University
CUHAS	=	Catholic University of Health and Allied Science
MoHSW	=	Ministry of Health and Social Welfare
PHSDP	=	Primary Health Services Development Programme
PHC	=	Primary Health Care
MDGs	=	Millennium Development Goals
NSEGPE	=	National Strategy for Economic Growth and Poverty Elimination
GPA	=	Grade Point Average
TMTB	=	Tanganyika Medical Training Board
CA	=	Continuous Assessment
GMP	=	Good Manufacturing Practice
WHO	=	World Health Organization
CTC	=	Care and Testing Clinic
COSHH	=	Control of Substances Hazardous to Health
BRELA	=	Business Registration and Licencing Agency
SoP	=	Standard Operating Procedure
ADR	=	Adverse Drugs Reaction
MKUKUTA	=	Mpango wa Kukuza na Kuondoa Umasikini Tanzania
ADDO	=	Accredited Dispensing Drugs Outlets
HIV/AIDS	=	Human Immunovirus/Acquired Immunodeficiency Syndrome

ACKNOWLEDGEMENTS

The review and harmonization of a competence-based curriculum for pharmaceutical sciences has been accomplished through involvement of different stakeholders.

Special thanks go to the Pharmacy Council for spearheading the review and harmonization of the pharmacy training curricula after noticing that training institutions in Tanzania were using different curricula.

I would also like to extend my gratitude to St. Luke Foundation (SLF)/Kilimanjaro School of Pharmacy - Moshi for their tireless effort to mobilize funds from development partners.

Likewise, I am very greatful to Deutsche Gesellschaft Für Internationale Zusammenarbeit (Giz), Merck Kgaa, Boehringer Ingelheim Gmbh and Bayer Pharma Ag and action medoer e.V for the financial and technical support.

Special thanks to Institutions conducting pharmacy training for their willingness to harmonize their curricula into standard national curriculum for pharmacy NTA 4 to 6.

Likewise I do recognise great ideas and contributions by experts from Kilimanjaro School of Pharmacy, School of Pharmaceutical Sciences – MUHAS, School of Pharmaceutical Technicians – CUHAS, School of Pharmacy – RuCU, St. Peters College of Health Sciences.

I would like to acknowledge the facilitation and commitment by Members of Secretariat from the National Council for Technical Education (NACTE) for their determined support to guide us in the improvement of this curriculum.

The list of those who contributed to this great job is too long to be registered here. The Human Resources Development Directorate and the MoHSW as a whole therefore wishes to take this opportunity to thank all those who actively took part in the curriculum development for the betterment of pharmaceutical training which will impact on health services provision in Tanzania.

Dr. Bumi L.A. Mwamasage
Assistant Director – Allied Health Training

NATIONAL COUNCIL FOR TECHNICAL EDUCATION
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FOREWORD

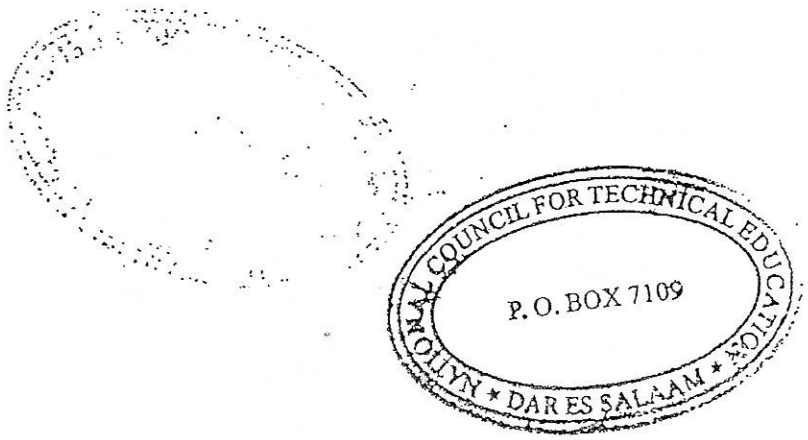
The Ministry of Health and Social Welfare (MoHSW) has committed itself to provide comprehensive access to quality health services for all Tanzanians in line with the National Development Vision and National Health Policy goals.

In order to attain these goals, the MoHSW has initiated Primary Health Services Development Programme (PHSDP). Among the strategies laid down in this programme is the human resource development to meet the human resource demand for health and a balanced skill mix.

This review and harmonization of the present pharmaceutical sciences curricula for certificate and diploma levels is in line with the policy measures currently being advocated by the MoHSW. In addition, the review of the previous curricula was intended to meet NACTE requirements for National Technical Awards (NTA) implementation, which require a modular curriculum pegged to NTA Levels as well as to match with the changing nature of health services as a bridge to responsive health care delivery.

It is the MoHSW's hope that this curriculum will enable pharmaceutical personnel to acquire necessary competencies in provision of quality pharmaceutical services to the community. It is also anticipated that institutions and stakeholders will find it useful in their academic undertakings.

Dr. Otilia T. Gowelle
Director, Human Resource and Development



EXECUTIVE SUMMARY

Adoption and implementation of the National Technical Awards (NTA) system is a mandatory requirement for technical training programmes to be accredited by the National Council for Technical Education (NACTE).

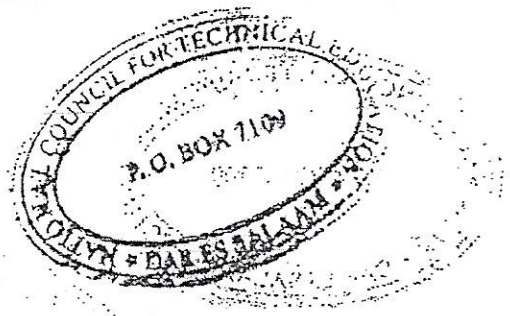
The Technician Certificate course in Pharmaceutical Sciences is a two semester programme, which has been developed to suit the needs of the health sector, the labour market demands and professional needs that exist in our country. It is one of the initiatives by the Government to modernise qualifications within the health sector.

Development of this programme is aimed at rewarding individual achievement in learning and competence gained in a variety of different ways and contexts. The introduction of this programme is geared towards increasing productivity in Pharmaceutical training institutions, providing a climbing ladder for higher learning skills opportunities and competences, and achieving more responsive education and training system, aligned with health sector employment needs.

The philosophy of developing Pharmaceutical Sciences programme at NTA Level 5 is to provide for a fairly well developed career path in pharmaceutical sciences education and competence acquisition. It opens the possibility for moving around and within the NTA qualification framework as established by NACTE and allows graduates to receive appropriate recognition.

This level is comprised of 11 Modules spread over two semesters. Each semester has 20 weeks which include theory and practical training.

Students will be required to work in dispensing, store and compounding areas under supervision as an important learning method and gaining hands on experience in the provision of pharmaceutical services as well as patient/client management and care. They will prepare reports using practical/skill books noting clearly what they will have learnt in their practice.



PART I: INTRODUCTION

1.1 Background Information

The development of human resource required in various health disciplines is very important for sustainable health care services delivery and national development. Currently, with the ongoing globalisation and increased competitiveness, it is important for MoHSW to use competent professionals to spearhead increased productivity in the health sector.

The National Bureau of Statistics estimated that there were 241 hospitals, 742 health centres and 5,680 dispensaries in the country (Tanzania in Figures 2012). Despite the existing network of primary health facilities, accessibility to health care services is still inadequate due to many reasons. In some areas the accessibility to health facilities is more than 10km whereas the Government intends to improve accessibility to be less than 5 kilometres to heath facilities. On the other hand, the availability of quality health care is inequitable, due to the fact that trained health personnel especially pharmaceutical personnel are inequitably deployed and it is estimated that only 35% of the existing primary health facilities are manned by skilled workforce of whom the majority are without appropriate pharmaceutical training.

As a result this contributes to high loss of medicines and excruciating mortalities to children and women in reproductive age groups who fail to access appropriate care at the time of need. The Maternal and Child Mortality rates are quite high standing at 578 per 100,000 live births and 68 per 1,000 live births respectively (DHS 2005).

On the other hand, the country is still grappling with a high burden of diseases from malaria, HIV/AIDS, TB and Leprosy, malnutrition and micronutrient deficiencies, child illnesses, accidents and non-communicable diseases are also on the increase.

It is within this context that MoHSW is changing the current curricula from the conventional knowledge-based to outcomes / competence based curricula with a flexible mode of delivery and assessment. It is expected that with these curricula, the country can achieve the objective of having semi qualified pharmaceutical personnel, who could work effectively and assist to meet the demands of the health sector. It is also expected that training institutions will ensure that students are equipped with necessary competences, which will enable them play roles requiring basic skills, knowledge and understanding and in which they take responsibility for their professional role.

The aim of the training programme is to supply the country with adequately trained technicians in pharmacy who will work in various health facilities and participate in the provision of basic pharmaceutical services.

1.2 Objectives of Developing Competence Based Curriculum for Pharmaceutical Sciences Training

The main objective of developing competence-based curriculum for pharmaceutical training is to produce pharmaceutical personnel at technician level who are competent to enable them work flexibly in different work places. The specific objectives include among other things to:

(i) Help trainees acquire the competences desired with the aim of enabling them to work

(iii) Implement the training programme using a wide range provisions, which satisfy th educational criteria for competent professional training;
(iv) Make training needs clear and specific, resulting in more efficient utilisation of trainin resources; and
(v) Facilitate more efficient educational exchange between trainers and trainees.

2.0 PROGRAMME RATIONALE AND PHILOSOPHY

2.1 Programme Rationale

The main objective of the National Health Policy (2003) is to improve the health and well-being of all Tanzanians, with a focus on those most at risk, and to encourage the health system to be more responsive to the needs of the people. This objective cannot be achieved without having appropriately and adequately trained pharmaceutical personnel and other health workers. According to WHO World Health Report 2006, health workers are crucially important for producing good health through the performance of health systems as they constitute a significant share of the labour force and perform key roles in all societies.

Tanzania Vision 2025, National Strategy for Economic Growth and Poverty Elimination (NSEGPE), Health for All, Primary Health Care (PHC) and Millennium Development Goals (MDGs) are not achievable without an appropriately prepared and deployed health workforce; and the training of health workers is crucial for achieving equity-oriented national health goals.

Pharmacy, like many other professions, is affected by the rapid changes currently taking place in the society, science and technology. It is also shaped by changing demography, epidemiology, health systems and consumer preference in the labour market. Therefore, strategic planning and actions should focus on investing in people, especially pre-service education to promote quality care and equity by correcting skill imbalances and in-service training to enhance the performance of the health system.

In this regard pharmaceutical sciences curricula must be responsive to changes in pharmacy practice, the society, the economy and changes in the nature of teaching and learning. It is important to provide an excellent education and training for all pharmaceutical sciences learners, to enable them and the health system to be responsive to the changing demands of life and work in the 21st century. It also been observed that pharmacy training has been taking long time unnecessarily due to duplication of contents in career path development.

This programme has been developed in line with the above considerations, which provides for a creation of a life-long learning culture, modularization, credit accumulation, student choice and scalability, leading to acquisition of relevant knowledge, skills and wider understanding in pharmaceutical sciences and health care practice.
The rationale for this programme is therefore to achieve more responsive pharmacy education and training system, aligned with health sector employment needs.

2.2 Programme Philosophy

Philosophy describes set of values and beliefs that guide all learning experiences of the curriculum. It is the basic foundation that directs all further planning, organisation, implementation and evaluation of the curriculum. This programme is geared towards

Pharmacy is an art and science of drugs discovery, manufacturing, distribution and use, therefore:

(i) The accessibility to the highest attainable standards of pharmaceutical services is a fundamental right of the human being irrespective of gender, age, race, religion, socio-cultural differences, political affiliation, economic or social background;

(ii) The practice of pharmacy is humanitarian in nature and requires knowledge, skills and attitudes in respect of compassion, respect and empathy, ethical and legal consideration in the provision of care;

(iii) Environment influences health of individuals, families and community at large. Therefore, a pharmaceutical personnel must acknowledge the different interaction patterns in the environment and the impact in interaction to health and illness;

(iv) Education is a continuous process that embraces new technology and community demands and therefore a pharmaceutical personnel shall keep abreast with current health development to render quality cost– effective services;

(v) The learner is a unique individual with past experiences and needs, which should be respected. She/he has the responsibility for her/his own learning and self-development through active participation; and

(vi) Collaboration is necessary for effective actions to occur. Training institutions shall maintain teamwork spirit at all levels of training environment.

It is therefore expected that since the programme adopts a modular system and will operate under semester structure, the graduates from this level will have aspirations to pursue higher qualifications in pharmacy profession. This will facilitate a large degree of flexibility for recognition of learning experiences and professional practice for the graduates' future development.

3.0 VISION AND MISSION OF THE TRAINING PROGRAMME

3.1 Vision

To have competent pharmaceutical personnel who will provide pharmaceutical services effectively in different health care settings and cope with existing and emerging health issues.

3.2 Mission

To establish conducive and sustainable training environment that will allow students and graduates to perform competently at their relevant levels and aspire for attainment of higher knowledge, skills and attitudes in promoting health, preventing diseases and caring for clients in all settings

4.0 AIM AND OBJECTIVES OF THE PROGRAMME

4.1 Aim of the Programme

The programme aim to achieve the following goals:

(i) To form a flexible course that is responsive to dynamic and rapidly changing world of work and the society

(ii) To provide pharmaceutical knowledge, skills and behaviours vital to learners, employers and the community;

(iii) To entice self-realisation and team work skills that enable graduates to perform efficiently and aspire for higher level training;

(iv) To build capacity to participate in the implementation of National Health Policy and its accompanying operational guidelines; and

(v) To propagate and promote moral, legal and ethical conduct among pharmaceutical

4.2 Objectives

The objectives of this programme are to:

(i) Form a career advancement in pharmacy practice and an operational role for pharmaceutical management in health care service delivery;

(ii) Impart appropriate knowledge, skills and attitudes relevant to pharmacy practice in relation to preventive and curative health care services in the community;

(iii) Steer creativity and innovativeness in response to challenges inherent in pharmacy practice and health care delivery;

(iv) Inculcate a culture of team work, build critical thinking and problem solving skills in pharmacy and health care practice

(v) Inculcate sense of citizenship, professionalism, accountability and responsibility in provision of health care services;

(vi) Stimulate life-long learning behaviour for pharmaceutical personnel and advancement of pharmacy profession; and

(vii) Provide an international outlook of the learning content and context so as to widen learners' advantage into regional and international labour market.

5.0 ADMISSION REQUIREMENTS

5.1 Direct Entry Requirements

The entry qualification for this programme shall be holders of Secondary Education Certificate (CSEE) with four passes (D) including three passes in sciences subjects (i.e Physics/Engineering Sciences, Chemistry and Biology).

5.2 Equivalent entry qualifications

Pharmaceutical dispenser (holder of NTA L4 certificate) with at least two years of working experience who has passed selection examination recognized by NACTE.

5.3 Mode of Application

Applicants should apply through the central admission system of the National Council for Technical Education at the www.nacte.go.tz

5.4 Selection Procedure

Selection will be done by NACTE and successful applicants shall obtain joining instructions from respective training institutions.

6.0 PROGRAMME DURATION

The NTA Level 5 programme has a total of 40 weeks of study divided in two semesters. Twenty two (22) weeks are set aside for theoretical training and eighteen (18) weeks are designated for pharmacy practice.

This level is meant to provide basic pharmaceutical sciences knowledge, skills and appropriate attitudes to students. All modules are fundamental and are intended to build students' knowledge and skills necessary for acquiring competences appropriate for modern practice of pharmacy; instil motivation for life-long learning and good foundation for progress studies in pharmacy profession.

7.0 ASSESSMENT

Assessment is an integral part of the learning process and must support and complement the learning strategies in order to achieve the required outcomes. Assessment in particular, must reflect the required progression and be capable [illegible]

7.1 Principles of Assessment

(i) Assessment will reflect aims and objectives of the overall scheme and learning outcomes of the module.

(ii) Assessment will be designed to assist students' learning, particularly, their development as self-directed learners and the acquisition of key skills.

(iii) Assessment will be varied to facilitate motivation and recognition of the need to adopt approaches which enable students to demonstrate and fulfill learning objectives.

(iv) Assessment will reflect progression through studying year, with increasingly more complex methods being associated with higher order skills.

7.2 Assessment Methods

The following assessment methods will be used:

7.2.1 Assignments

The object of assignments is to reinforce the learning process by involving the students in finding solution to a given question or problem which require decision- making. They include tasks given to students apart from written tests and examinations or projects, so as to enhance self- development.

Individual or group assignments will be in form of written work and/or practical exercises. For each module appropriate assessment methods and instruments will be indicated. Facilitators will administer not less than two assignments for a given module in a semester.

7.2.2 Competence Tests

The intention of competence tests is to measure the practical capability of learners through actual doing of a particular task or skill. This will be conducted in actual or simulated environment.

7.2.3 Class Room Knowledge Tests

The intention of classroom tests is to measure theoretical and practical performance of students through evaluation of written work and actual doing respectively.

There will be a minimum of two written classroom tests in each semester under supervision of qualified tutor (s). Duration of each test will be not less than two (2) hours.

7.2.4 End of Module Examination

This examination shall be conducted for duration of three (3) hours under supervision of qualified tutor (s).

7.3 Management of Assessment

The mode of conduct and administration of assessment shall be that approved by NACTE.

8.0 MINIMUM CREDIT REQUIREMENT

This Programme has 11 modules, which are assigned 120 credits.

9.0 MODULE CODING

The system of coding has adopted a combination of letters and numbers, which have a specific meaning. For example the following modules offered in the first semester by the department of Pharmaceutical Sciences may be coded respectively as PST 05103 where:

PST 05103 refers to Pharmaceutical Microbiology module.

PS Represents the first two letters of the department "Pharmaceutical Sciences".

T Represent the qualification at the respective level "Technician".

05 Represents the respective NTA Level.

1 Indicates the semester in which the module is conducted

03 Represents the serial number to which a particular module is assigned in th department (in this case 3rd Module).

10.0 GRADING SYSTEM

Marks will be awarded out of 100 per cent. The marks so obtained from different assessmen components will be graded as follows:

S/N	SCORE RANGE	GRADE	DEFINITION
1.	80 – 100	A	Excellent
2.	65 – 79	B	Good
3.	50 – 64	C	Average
4.	40 – 49	D	Poor
5.	0 – 39	F	Failure
6.	–	I	Incomplete
7.	0	Q	Disqualification

11.0 CLASSIFICATION OF AWARD

Grades for the different score ranges are assigned points as follows:

A – 4

B – 3

C – 2

D – 1

F – 0

The Grade Point Average (GPA) shall be computed from credits and grade weights and classified as shown below:

CLASS OF AWARD	CUMMULATIVE GPA
First class	3.5 – 4.0
Second class	3.0 – 3.4
Pass	2.0 – 2.9

An award shall be given to a student who satisfies the following conditions:

(i) She/he must have successfully completed all modules for which the award is to be made; and

(ii) She/he has achieved the minimum cumulative Grade Point Average (GPA) equivalent to pass.

11.1 Computation of Cumulative GPA

(i) A cumulative grade point average (Cum GPA) for each candidate shall be computed by dividing the total number of grade points earned for all modules by the total number for the award examined.

$$i.e. cummulative\ GPA = \frac{SUM\ OF\ (PxN)}{SUMOF\ N}$$

(ii) The Grade Point Average (GPA) shall be computed and truncated so that it won't provide a range of decimal point.

12.0 EXAMINATIONS REGULATIONS

The General Ministry of Health and Social Welfare (MoHSW) Examination Regulations for Training Institutions on registration for examinations, board of examiners, preservation of scripts, procedures for appeals, examination offences and penalties, examination fees and certification and awards shall remain as stipulated in the MoHSW Examination Regulations.

12.1 Eligibility for Examinations

(i) A student must have been present for at least 90% of the classes to be allowed to sit for end of semester examinations.

(ii) A student who fails to meet a minimum of 90% attendance in a particular semester with compelling reasons as determined by the participatory organs shall be allowed to repeat the semester otherwise he/she shall be discontinued from studies.

(iii) No student shall be allowed to sit for the end of semester examinations unless his/her average continuous assessment in each module is 50% or higher.

(iv) A student who fails to complete assignment(s) or research work in the scheduled time shall not be allowed to sit for the end of semester examinations.

(v) Where a student who fails to fulfil the eligibility requirements stipulated, sits for the end of semester examinations, his/her examination results shall be null and void.

12.2 Conduct of Examinations

End of semester examinations shall be conducted under the control and supervision of MoHSW or any other body as the MoHSW shall appoint.

12.2 Guidance for Invigilators

12.3.1 Before the examination:

(i) Invigilators shall personally collect from the head of the department sealed envelopes containing examination papers and any other materials prescribed in the rubrics at least thirty minutes before the examination.

(ii) Invigilators shall be present in the examination room at least twenty minutes before commencement of the examination.

(iii) Invigilators shall admit candidates into the examination room at least twenty minutes before commencement of the examination and ensure that candidates are seated in their right places.

12.3.2 During the examination:

(i) No candidate shall be allowed out of the examination room during the first thirty minutes of the examination

(ii) No candidate shall be allowed to leave the examination room during the last thirty minutes.

(iii) Invigilator shall allow five minutes for the candidates to read the examination paper and ensure they have the right paper with correct number of pages.

12.3.3 At the end of examination:

(i) Invigilator shall tell the candidates to stop attempting the examination and assemble

(ii) Candidates shall hand in their scripts to the invigilator and sign an examination attendance form

(iii) No candidate shall be allowed to leave the examination room before their scripts are collected

(iv) No candidate shall be allowed to leave with any examination materials found in the examination room.

(v) Invigilators shall enter the total of scripts collected and sign in the examination attendance form (Appendix 1) and submit the scripts and the examination attendance form to the head of the department.

12.4 Absence from Examinations

(i) A student who fails to appear for a scheduled examination with valid reason (s) shall be allowed to sit for that particular examination when next scheduled. The student shall not be allowed to proceed to the next semester if the missed examination(s) is for a pre-requisite module.

(ii) When a candidate misses an examination without valid reason(s), as determined by participatory organs (i.e. academic committees/boards), the candidate shall be discontinued from the studies.

12.5 Failing Sick Immediately Before or During Examination

A candidate who falls sick immediately before or during the time of a scheduled examination and is medically unable to proceed (i.e. as certified by a medical officer) shall be allowed to postpone the examination until next scheduled. Any student, who is sick and nevertheless decides to take or proceed with an examination, does so at his/her own risk and must abide by the results of the examination.

12.6 Reporting Late for Examinations

(i) A candidate, who without valid reasons, reports late for an examination (more than thirty minutes after commencement of examination) shall not be allowed into the examination room but will be allowed to sit for that particular examination when next scheduled. The candidate shall not be allowed to proceed to the next semester if the missed examination(s) is/are for pre-requisite module(s).

(ii) A candidate, who for valid reason, reports late for an examination (more than thirty minutes after commencement of examination) and pleads in writing to take the examination may, subject to the discretion of the invigilator, be allowed to do the examination within the remaining time at his/her own risk. All cases of late arrivals for examinations shall be reported in writing by the invigilator to head of department.

12.7 Students Progression and Disposal

(i) The semester shall be the basic academic audit unit. All modules offered during the semester shall be assessed within that semester, at the end of each module external examiners or moderators shall be invited at the end of the semester. A student shall be allowed to proceed to the next semester if he/she passes end of module examinations in all modules prescribed in a semester.

(ii) For every module there shall be at least two continuous assessment (CA) tests and regular assessment of competencies which shall constitute 60% of summative assessment. The end of module examination shall constitute another 40% of the summative assessment.

12.8 Supplementary Examination

(i) A candidate who fails one or more modules shall be allowed to sit for supplementary examination if his/her GPA is the

(ii) A candidate who fails one or more modules must sit for supplementary examinations when scheduled before proceeding to the next semester. The student who passes a supplementary examination will be awarded a maximum of "C" grade regardless of his/her score (equivalent to 50% score). The passing of supplementary examination shall take into account the continuous assessment scores.

12.9 **Repeating the Semester**

(i) A candidate who fails to obtain an average of 50% in his/her continuous assessment shall repeat the semester.

(ii) A candidate who fails supplementary examination(s) shall repeat the semester. A candidate who fails a repeated semester shall be discontinued from studies.

(iii) A candidate who fails to meet a minimum of 90% attendance in a particular semester with acceptable grounds as determined by the participatory organs shall repeat the semester.

12.10 **Discontinuation**

(i) A candidate who fails to meet a minimum of 90% attendance in a particular semester without acceptable grounds shall be discontinued from studies.

(ii) When a candidate misses examination(s) without valid reason(s) shall be discontinued from the studies.

(iii) A candidate who obtains a semester GPA of less than 1.8 shall be discontinued from studies.

(iv) A candidate who does not appear for supplementary examination(s) without compelling reason(s) approved by participatory organs shall be discontinued from studies.

(v) A candidate found guilty of an examination irregularity shall be discontinued from studies.

(vi) A candidate who has been disqualified from an examination following his/her walking out of the examination room in protest shall be discontinued from studies.

12.11 Examination Irregularities or Academic Dishonesty

Examination irregularities shall include but not limited to:

(i) A candidate found with unauthorized materials/information at any time during the examination process. Such unauthorized materials will include written pieces of papers, mobile/cellular phones or any other unauthorized materials.

(ii) A candidate attempting to copy from another candidate's work or permitting another candidate to do so.

(iii) A candidate communicating with another candidate by giving or obtaining unauthorized assistance or attempting to do so.

(iv) A candidate removing question papers, scripts or any other examination materials found in the examination room.

(v) A candidate starting to attempt examination before being authorized to do so.

(vi) A candidate continuing to attempt the examination after being ordered to stop.

(vii) A candidate refusing to obey a lawful order given by an invigilator.

(viii) A candidate destroying or attempting to destroy evidence of suspected irregularities.

(ix) A candidate found to have committed plagiarism.

(x) A candidate behaving in such a manner as to disrupt the examination process

(xi) An invigilator violating examinations regulations

12.11 Procedure for Dealing with Examination Irregularities

In case of alleged examinations irregularity:

(i) The candidate shall be stopped by the invigilator from continuing with the examination and be required to sign an examination irregularity report (Appendix 2) and the materials pertinent to the incidence to confirm that they are his/hers. However, the candidate shall be allowed to sit for the remaining examinations.

(ii) The invigilator shall counter sign and submit to the head of department the examination irregularity report together with the candidate's examination script and all pertinent materials immediately after the end of examination for further transmission through appropriate participatory organs for action as stipulated in the examination offences and penalties of the MoHSW Examination Regulations.

12.12 Instruction to Students

(i) Candidates shall be admitted into examination room twenty minutes before the examination starts.

(ii) No candidate shall be permitted to enter the examination room 30 minutes after commencement of the examination.

(iii) Candidates without examination numbers and identity cards shall not be allowed into the examination room.

(iv) Candidates are responsible for consulting examinations time table for any changes.

(v) Candidates are not allowed to enter examination room with books, bags, purses, notes, rough papers, mobile phones, or other such items.

(vi) When candidates are allowed to bring specified items in the examination room, no borrowing from one another will be allowed during examination time, and the items allowed will be liable to inspection by the invigilator.

(vii) Candidates shall follow the examination instructions.

(viii) Candidates shall write only their examination numbers on every page used. Candidates shall not write their names anywhere in the script.

(ix) No candidate shall be allowed to leave the examination room during the last thirty minutes.

(x) At all times during the examination, the candidate's examination number/identity card shall be conspicuously placed on the desk in front of the student by the student.

(xi) Smoking, beverages and food shall not be allowed into the examination room. Any special needs for eating, drinking or medication shall be reported to the invigilator before start of the examination.

(xii) At the end of examination, and on the instruction of the invigilator, candidates shall be required to stop writing, and organize their work. The candidate shall personally hand in his/her scripts to the invigilator and sign to that effect.

(xiii) Candidates are allowed to bring pens, pencils and other materials explicitly prescribed by the department into the examination room.

(xiv) For a candidate wishing to answer a call of nature may, with permission of invigilator and under escort, leave the examination room for a period of time not exceeding five (5) minutes. Only one candidate at a time will be allowed to leave the examination room and will be monitored at all times.

(xv) A candidate who walks out of the examination in protest shall be disqualified from that particular examination.

(xvi) Candidates must understand that the ultimate responsibility for taking supplementary examination(s) at the correct time rests on him/her.

(xvii) Invigilator(s) shall have the power to:

- Specify and change the sitting arrangement in the examination room.

- Confiscate any unauthorized material and to remove from the examination room any candidate found with such material.
- Remove from the examination room any candidate who disrupts the examination process

12.14 Release and publication of Examination Results

The head of department may publish the examinations results provisionally subject to approval by the Tanganyika Medical and Training Board (TMTB) as recommended by the participatory organs.

12.15 Examination Components Contribution

Due to the nature of pharmacy training, this programme is constituted by theory modules and practical modules. For each module there shall be at least two continuous assessment (CA) tests and regular assessment of competencies which shall constitute 60% of summative assessment. The end of module examination shall constitute another 40% of the summative assessment.

Summary of contribution of components of assessment to final mark

Module	Continuous Assessment Tests (%)	End of Semester Examination (%)	Grand Total (%)
Theory Modules	60	40	100
Practical Modules	60	40	100

12.16 Examination Appeals

The appeals of candidates, who have not satisfied the examiners, should follow the process described in the training regulation of the Ministry of Health and Social Welfare.

13.0 Teaching personnel

Tutors for modules in this programme should have at least an Ordinary Diploma in relevant field and/or evidence of competency in respective module.

14.0 Training regulations

NATIONAL COUNCIL FOR TECHNICAL EDUCATION
P. O. BOX 7109
DAR ES SALAAM

14.1 Reporting to the Training Institution

Students selected for admission should report to the training institution not more than 15 days after commencement of the academic year.

14.2 Programme Completion Requirements

For a candidate to qualify for award of the qualification of this NTA Level must have attended classes by not less than 90% of the total programme sessions, submitted required assignments and reports and passed all modules and acquired a cumulative GPA of not less than 2.0 (i.e. equivalent to a "C" grade).

14.3 Period of Absence

A student who fails to meet a minimum of 90% attendance in a particular semester with compelling reasons as determined by the participatory organs shall be allowed to repeat the semester otherwise he/she shall be discontinued from studies.

15.0 PROGRAMME MODULES

15.1 - Semester I Modules

Code	Module Title	Scheme of Study (Hours per week)				Credits / Semester
		Theory	Tutorials	Practical	Assignment	
PST05101	Medicines and Medical Supplies Management	4	-	1	1	12
PST05102	Law and Policies in Pharmacy Practice	2	-	-	1	7
PST05103	Pharmaceutical Microbiology	4	1	-	1	12
PST05104	Pharmacology and Therapeutics	4	1	-	1	12
PST05105	Rational Use of Medicines	2	-	-	1	4
PST05106	Pharmaceutical Organic Chemistry	4	1	-	1	12
	SUB-TOTAL	20	3	1	6	59

15.2 Semester II Modules

Code	Module Title	Scheme of Study (Hours per week)				Credits / Semester
		Theory	Tutorials	Practical	Assignment	
PST 05207	Quality Assurance of Pharmaceutical Products	2	1	2	1	12
PST 05208	Pharmaceutics Theory and Compounding	2	1	2	1	20
PST 05209	Health Information Management	4	1	2	1	12
PST 05210	Basic Pharmacognosy	4	1	-	1	12
	TOTAL	12	4	10	4	56

Code	Module Title	Scheme of Practice (Hrs per week over six weeks)				Credits
		Dispensing	Drugs Store	Industrial	Non Sterile Preparations	
PST05 211	Pharmacy Practice	120	120	0	0	5

15.3 Summary of Modules

CODE	MODULE TITLES	TOTAL CREDITS	SEMESTER I	SEMESTER
PST05101	Medicines and Medical Supplies Management	12	√	
PST05102	Law and Policies in Pharmacy Practice	7	√	
PST05103	Pharmaceutical Microbiology	12	√	
PST05104	Pharmacology and Therapeutics	12	√	
PST05105	Rational Use of Medicines	4	√	
PST05106	Pharmaceutical Organic Chemistry	12	√	
PST05207	Quality Assurance of Pharmaceutical Products	12		√
PST05208	Pharmaceutics Theory and Compounding	20		√
PST05209	Health Information Management	12		√
PST05210	Basic Pharmacognosy	12		√
PST05211	Pharmacy Practice	5		√
	TOTAL CREDITS	**120**		

PART II – CURRICULUM DETAILS

QUALIFICATION:	TECHNICIAN CERTIFICATE IN PHARMACEUTICAL SCIENCES
Purpose(s) of Qualification:	This qualification is intended for a person who will perform basic pharmaceutical services in a broad range of work activities some of which are non-routine; including (dispensing), preparation of facility-based sterile and non-sterile pharmaceutical products, supply chain systems and take part in providing health education to clients in health care settings.
NTA Level:	5
Competence Descriptors:	Competence involving application of skills and knowledge in broad a range of activities some of which are non-routine.
Credits at this Level:	120
Cumulative Credits from Lowest Level:	0
Date the Qualification Standard Last	December, 2014

8.0 Principle Outcomes, Credits and Assessment Criteria

S/No.	PRINCIPLE OUTCOME	CREDITS	ASSESSMENT CRITERIA
1	Apply basic principles of selection, forecasting, procurement and inter-facility distribution in maintaining constant supply of medicines and medical supplies in health care settings.	15	(i) Principles of medicines selection correctly described. (ii) Methods of medicines procurement clearly explained. (iii) Methods for medicines quantification correctly described. (iv) Policies and legal framework guiding medicines selection and procurement correctly described. (v) Procedures for inter-facility distribution of medicines and medical supplies are described. (vi) Roles of pharmaceutical assistants are well spelt out. (vii) Transport logistics (cold chain system) are well described. (viii) Defective, unsafe and recalled products correctly identified, removed, disposed and reported
2	Apply Good Manufacturing Practise (GMP) and techniques in preparation of facility-based non-sterile and sterile pharmaceutical products.	20	(i) Components of GMP are correctly described. (ii) Aseptic techniques are correctly explained. (iii) Suitable conditions, equipment and use of formula and techniques for non-sterile and sterile preparations are correctly described. (iv) Techniques and procedures for QA and QC correctly described and demonstrated
3	Differentiate microorganisms and their roles as agents of diseases and various methods used in controlling and preventing microbial infections.	20	(i) Classes of microorganisms of health importance correctly described (ii) Cause, transmission, management and prevention of endemic microbial infections of various body systems correctly described (iii) Immunology and vaccination principles correctly described (iv) Immunology preparations and uses correctly described (v) Methods of common disease control and prevention correctly described (vi) Management of Tuberculosis

4	Apply principles of Pharmacology and Therapeutics in patient management and rational use of medicines in compliant with the legal framework.	20	(i) Pharmacology and therapeutics of essential medicines well described (ii) National Essential Medicines List and Standard Treatment Guidelines clearly recognised (iii) Impact of Irrational Use of Medicines correctly described (iv) Dispensing of controlled and prescription only medicines according to the legal framework correctly described
5	Use ICT in the provision of pharmaceutical services.	10	(i) Different ICT applications are well described and demonstrated (ii) Use of relevant computer packages in delivery of pharmaceutical services correctly demonstrated (iii) Information and data for pharmaceutical services are correctly identified, stored, retrieved and used (iv) Documentation, report writing and information sharing well practiced
6	Utilize knowledge of chemistry in differentiating medicines in providing pharmaceutical care and services	35	(i) Sources of medicines correctly described (ii) Structure and function of medicinal plant parts are well described (iii) Classes of natural and synthetic medicine correctly described (iv) Chemical and physical properties and uses of natural and synthetic medicine correctly described (v) Methods for cultivation, harvesting, extraction and storage of natural occurring drugs correctly described (vi) Basic organic chemistry applied in pharmacy practise correctly described (vii) Principles of Structure Activity Relationship of drugs compounds correctly described

9.0Principal and Enabling Outcomes

S/No.	PRINCIPLE OUTCOME	ENABLING OUTCOMES
1	Apply basic principles of selection, forecasting, procurement and inter-facility distribution in maintaining constant supply of medicines and medical supplies in health care settings.	1.1 Apply basic principles of procurement of medicines and medical supplies in provision of pharmaceutical services.
		1.2 Apply legislations governing procurement and use of medicines and medical supplies
		1.3 Describe policy guidelines in relation to procurement and use of medicines and medical supplies
2	Apply Good Manufacturing Practice (GMP) and techniques in preparation of facility-based sterile and non-sterile pharmaceutical products.	2.1 Describe components of GMP in preparation of pharmaceutical products
		2.2 Apply principles of GMP in the preparation of facility based pharmaceutical products
		2.3 Apply principles of GMP in operation and maintenance of equipment and machines in a facility.
3	Describe microorganisms and their roles as agents of diseases and various methods used in controlling and preventing microbial infections.	3.1 Describe bacteriology of medical and pharmaceutical importance
		3.2 Describe virology of medical and pharmaceutical importance
		3.3 Describe parasitology of medical and pharmaceutical importance
		3.4 Describe mycology of medical and pharmaceutical importance
		3.5 Describe methods of controlling and preventing microbial infections.
		3.6 Describe preservation of pharmaceutical products
		3.7 Describe principles of immunology and vaccination in relation to pharmaceutical care
4	Apply principles of pharmacology in promotion of rational use of medicines	4.1 Describe pharmacology of essential medicines based on their therapeutic classes
		4.2 Apply guidelines in controlling irrational use of medicines
		4.3 Apply laws governing controlled and prescription

5	Apply Information Communication Technology (ICT) in provision of health care services.	5.1 Apply relevant computer packages in delivery of pharmaceutical services.
		5.2 Apply health management information system (HMIS) to capture, process and store health information
		5.3 Use Logistics Management Information System (LMIS) in the delivery of pharmaceutical services.
6	Describe basic principles and concepts governing sources, structures and functions of pharmaceuticals	6.1 Describe basic organic chemistry in relation to provision of pharmaceutical services
		6.2 Describe basic pharmacognosy in relation to pharmaceuticals.
		6.3 Describe chemical structures of pharmaceutical products used in health care setting.

10.0 Enabling and Sub-enabling Outcomes

S/No.	ENABLING OUTCOMES	SUB-ENABLING OUTCOMES
1.1	Apply basic principles of procurement of medicines and medical supplies in provision of pharmaceutical services.	1.1.1 Describe the purpose of health supply chain management.
		1.1.2 Describe quantification methods and forecasting of medicines and medical supplies.
		1.1.3 Describe procurement process of medicines and medical supplies
1.2	Apply legislations governing procurement and use of medicines and medical supplies	1.2.1 Explain legislations governing procurement of medicines and medical supplies in the public health facilities.
		1.2.2 Explain legislations governing procurement of controlled substances
		1.2.3 Explain major procurement agencies for medicines and medical supplies
1.3	Describe policy guidelines in relation to procurement and use of medicines and medical supplies	1.3.1 Explain national medicines policy in relation to pharmaceutical services
		1.3.2 Explain policies and guidelines governing procurement of medicines for HIV/AIDS, TB and Leprosy.
		1.3.3 Explain policies and guidelines governing procurement of medicines and medical supplies for vertical programmes.
2.1	Describe components of GMP in preparation of	2.1.1 Explain the principles of Good Manufacturing Practices.

		2.1.3 Describe quality control and assurance in relati to preparation of pharmaceutical products
2.2	Apply principles of GMP in the preparation of facility based pharmaceutical products	2.2.1 Describe sterile pharmaceutical preparations
		2.2.2 Describe requirements for preparation of steri pharmaceutical products
		2.2.3 Use formula in the preparation of pharmaceutica products
		2.2.4 Describe formulation of semi-solid pharmaceutical preparations
		2.2.5 Perform calculations on isotonicity, electrolytes, constitutions, intravenous admixtures and rate of flow.
2.3	Apply principles of GMP in operation and maintenance of equipment and machines in a facility.	2.3.1 Explain standard operating procedures of equipment and machines in facility-based pharmaceutical preparation unit
		2.3.2 Explain the operating principles of equipment and machines in facility-based pharmaceutical preparation unit.
		2.3.3 Explain preventive maintenance procedures for equipment and machines in facility-based pharmaceutical preparation unit
3.1	Describe microorganisms and their roles as disease causing agents.	3.1.1 Describe fundamentals principles, concepts and importance of microbiology in pharmacy practice
		3.1.2 Describe bacteriology of medical and pharmaceutical importance
		3.1.3 Describe virology of medical and pharmaceutical importance
		3.1.4 Describe parasitology of medical and pharmaceutical importance
		Describe mycology of medical and pharmaceutical importance
		3.1.6 Describe management of common bacterial, viral, fungal and parasitic diseases
3.2	Describe methods of controlling and preventing microbial infections.	3.2.1 Explain principles of antisepsis, disinfection and sterilisation
		3.2.2 Describe conditions requiring antisepsis and disinfection
		3.2.3 Describe methods and agents used in sterilisation
3.3	Describe preservation of pharmaceutical products	3.3.1 Explain concepts of preserving pharmaceutical products
		3.3.2 Describe agents used in preservation of pharmaceutical products
		3.3.3 Describe procedures for quality testing of pharmaceutical products.
3.4	Describe principles of immunology and vaccination in relation to	3.4.1 Describe concept of immunology and immunization

		3.4.3 Describe procedures of handling immunological products
4.1	Describe pharmacology of essential medicines based on their therapeutic classes	4.1.1 Describe pharmacokinetics of essential medicines.
		4.1.2 Describe pharmacodynamics of essential medicines
		4.1.3 Describe side effects, contraindications and adverse reactions of essential medicines
		4.1.4 Describe concept of toxicology
4.2	Apply guidelines in controlling irrational use of medicines	4.2.1 Describe causes of irrational use of medicines and associated problems.
		4.2.2 Explain essential medicines concept in promoting rational use of medicines.
		4.2.3 Explain the role of drug marketing and promotions in supporting rational use of medicines.
4.3	Apply laws governing controlled and prescription medicines	4.3.1 Describe procedures for handling controlled medicines
		4.3.2 Explain policies governing the handling of prescription only medicines
		4.3.3 Explain legislation governing the handling of controlled medicines
5.1	Apply relevant computer packages in delivery of pharmaceutical services.	5.1.1 Organize health related data using computer packages
		5.1.2 Analyse health related data using computer packages
		5.1.3 Report and present health related information using computer packages
		5.1.4 Use computer applications for data backup, information searching and learning
		5.1.5 Use computer packages in ordering, invoicing, dispensing, selling and inventory management
5.2	Apply health management information system (HMIS) to capture, process and store health information	5.2.1 Describe components of the WHO health management information system
		5.2.2 Use MTUHA database in capturing and managing pharmaceutical data
		5.2.3 Perform simple data analysis using MTUHA database
5.3	Use Logistics Management Information System (LMIS) in the delivery of pharmaceutical services.	5.3.1 Describe the components of Integrated logistics system
		5.3.2 Describe management of pharmaceutical information in vertical programs.
		5.3.3 Use networking programs in disseminating pharmaceutical information.
6.1	Describe basic organic chemistry in relation to provision of	6.1.1 Describe the concept of organic chemistry in pharmacy
		6.1.2 Describe classification of organic compounds and

		6.1.3	Describe chemical reactions involving organ compounds
6.2	Describe the importance of basic pharmacognosy in production of pharmaceutical products.	6.2.1	Describe basic structure and functions of pla parts
		6.2.2	Describe natural sources of drugs
		6.2.3	Explain the importance and use of natural source of drugs in pharmacy practice
		6.2.4	Explain cultivation, distribution, collection and storage of medicinal plants
		6.2.5	Explain methods for processing and extraction of active medicinal principals from natural sources
		6.2.6	Identify medicinal plants containing toxic substances.
		6.2.7	Describe active medicinal principals from natural sources
6.3	Describe chemical structures of pharmaceutical products used in health care setting.	6.3.1	Explain the concept of isomerism
		6.3.2	Explain biotransformation methods of medicinal products
		6.3.3	Describe structure-activity relationship of drugs

11.0 ASSESSMENT CRITERIA AND THEIR BENCHMARKING

11.1 Sub-enabling Outcomes, Related Tasks, Assessment Criteria, Methods and Instruments

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
1.1.1 Describe the purpose of health supply chain management.	a) Define supply chain in relation to management of medicines and medical supplies	Purpose of health supply chain management for medicines and medical supplies described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List the components of health supply chain management			
	c) Explain the components of health supply chain management			
	d) Define selection in relation to medicines and medical supplies			
	e) Explain importance of medicines and medical supplies selection			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	f) Mention criteria for selection of medicines and medical supplies			
	g) List problems facing selection of medicines and medical supplies			
1.1.2 Describe quantification methods and forecasting of medicines	a) Define terms quantification and forecasting as applied in medicines and medical supplies	Medicines quantification methods and forecasting of medicines correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List objectives of quantification			
	c) List and explain methods of quantification			
	d) Explain application of the quantification methods			
	e) Describe issues to consider in quantification			
1.1.3 Describe procurement process of medicines and medical supplies	a) Define terms used in procurement of medicines and medical supplies	Medicines and medical supplies procurement process correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List objectives of good procurement			
	c) List operation principles for good procurement			
	d) Mention good procurement practices for medicines and medical supplies			
	e) List steps in the procurement cycle			
	f) List methods for procurement of medicines and medical supplies			
	g) Identify criteria for selecting a			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instrument
	methods			
	h) List sources of medicines and medical supplies for procurement			
	i) Explain the quality assurance in procurement of medicines and medical supplies			
	j) Explain drug donation and list its associated benefits and problems			
1.2.1 Explain legislations governing procurement of medicines and medical supplies	a) Explain sections of the Public Procurement Act, 2011 regulating procurement of medicines and medical supplies	Legislations governing procurement of medicines and medical supplies are correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Describe sections of the Tanzania Food and Cosmetics Act, 2003 regulating procurement of medicines and medical supplies			
	c) Describe sections of the Medical Stores Department Act, 1993 regulating procurement of medicines and medical supplies			
1.2.2 Explain legislations governing procurement of controlled substances	a) Define controlled substances	Legislations governing procurement of controlled substances explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Classify controlled substances			
	c) Describe sections of the Tanzania Food and Cosmetics Act			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	procurement of controlled substances			
	d) Explain sections of the Drugs and Prevention of Illicit Drugs Traffic Act, 1971 governing procurement of controlled substances			
	e) Explain international conventions ratified in the United Republic of Tanzania regarding controlled drugs and psychotropic substances			
1.2.3 Explain major procurement agencies for medicines and medical supplies	a) List major procurement agencies for medicines and medical supplies in Tanzania	Major procurement agencies for medicines and medical supplies correctly describes	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain the structure and functions of Medical stores Department			
	c) Explain the Autonomous supply agencies for public and private procurement of medicines (MEMS, action Medeor etc.)			
	d) Explain the prime vendor systems			
1.3.1Explain national	a) Define national drug policy	National medicines	Oral questioning	Checklist Question

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instrument
pharmaceutical services	b) List goals of national drug policy c) Outline objectives of the national drug/medicine policy d) List components of drug/medicine policy e) Explain the importance of the Standard Treatment Guidelines	pharmaceutical services explained		scheme Assignment report
1.3.2 Explain policies and guidelines governing procurement of medicines for HIV/AIDS, TB and Leprosy.	a) List the vertical programmes existing in Tanzania b) Explain procedure for procuring medicines for vertical programmes c) List objectives of NACP, Malaria and TB& Leprosy programmes	Policies and guidelines governing procurement of medicines for HIV/AIDS, TB and Leprosy. are correctly explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
1.3.3 Explain policies and guidelines governing procurement of medicines and medical supplies for vertical programmes	a) List objectives of vertical programmes existing in Tanzania b) Explain procedure for procurement of medicines for vertical programmes c) Explain the role of vertical programme in enhancing access to medicines	Policies and guidelines governing procurement of medicines and medical supplies for vertical programmes explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
2.1.1 Explain the principles of Good Manufacturing	a) Define Good Manufacturing Practices	Principles of Good manufacturing	Oral questioning Written tests	Checklist Question papers and

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	c) Explain the importance of GMP in pharmaceutical manufacturing	explained		Assignment report
2.1.2 Explain components of Good Manufacturing Practices.	a) List the Components of GMP	Components of GMP correctly explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain premise requirements			
	c) Explain personnel requirements			
	d) Explain raw materials requirements			
	e) Explain documentation requirements			
	f) Explain equipment requirements			
2.1.3 Describe quality control and assurance in relation to preparation of pharmaceutical products	a) Define quality assurance	Quality control and assurance in relation to preparation of pharmaceutical products correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Define quality Control			
	c) List functions of quality control laboratory in relation to preparation of pharmaceutical products			
2.2.1 Describe sterile pharmaceutical preparations	a) Define sterile pharmaceutical products	Sterile pharmaceutical preparations described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain categories of sterile pharmaceutical products			
	c) List qualities of sterile pharmaceutical products			
	d) Explain the role of aseptic techniques			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessm Instrum
	in pharmaceutical production			
2.2.2 Describe requirements for preparation of sterile pharmaceutical products	a) Explain the concept of aseptic processing	Requirements for preparation of sterile pharmaceutical products described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignmen report
	b) Explain premise requirements for sterile production			
	c) Explain personnel requirements for sterile production			
	d) Explain raw materials requirements for sterile production			
	e) Explain documentation requirements for sterile production			
	f) Explain equipment requirements for sterile production			
2.2.3 Use formula in the preparation of pharmaceutical products	a) Define monographs	Formula in the preparation of pharmaceutical products correctly used	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignmen report
	b) List different types of references used in pharmaceutical production			
	c) Identify formula for pharmaceutical preparation			
	d) Reduce or enlarge official formula to obtain required formula for compounding			
	e) Compound semi-solid preparations			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
2.2.4.Describe formulation of semi-solid pharmaceutical preparations	a) Define semisolid pharmaceutical preparations b) List ideal properties of semi-solid preparations c) Explain percutaneous absorption d) Explain factors affecting percutaneous absorption e) Explain rational approaches to topical formulation f) List treatment target for semi-solid preparations g) Explain the components of semi-solid preparations (ointments, creams, pastes, gels etc.) h) Explain containers, closures and labelling of semi-solid preparations	Formulation of semi-solid pharmaceutical preparations described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
2.2.5 Perform calculations on isotonicity, electrolytes, constitutions, intravenous admixtures and rate of flow	a) Define terms used in isotonicity and electrolytes b) Explain the importance of isotonic solutions c) Perform calculations of isotonicity by freezing point methods, sodium chloride equivalent, and molecular concentrations d) Calculate milliequivalents, millimoles, milliosmoles and osmolarity/osmolality	Calculations on isotonicity, electrolytes, constitutions, intravenous admixtures and rate of flow correctly performed	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instrument
	e) Perform calculations of constituted solutions, intravenous admixture and rate of flow			
	f) Perform calculations of pH, buffers and buffer solutions			
2.3.1 Explain standard operating procedures of equipment and machines in facility-based pharmaceutical preparation unit	a) Define standard operating procedures	Standard operating procedures of equipment and machines in facility-based pharmaceutical preparation unit explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain the components of an SOP			
	c) Explain the importance of SOPs in the production of pharmaceuticals			
2.3.2. Explain the operating principles of equipment and machines in facility-based pharmaceutical preparation unit	a) List equipment used in facility based pharmaceutical preparation unit (reverse osmosis machine, distiller, autoclave, de-ionizer etc.)	Operating principles of equipment and machines in facility-based pharmaceutical preparation unit explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain the operating principles of an autoclave			
	c) Explain the operating principles of a reverse osmosis machine			
	d) Explain the operating principles of a de-ionizer			
	e) Explain the operating principles of a			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
2.3.3 Explain preventive maintenance procedures for equipment and machines in facility-based pharmaceutical preparation unit	a) Explain the importance of proper preventive maintenance of equipment and machines b) Describe general considerations in preventive maintenance of machines and equipment c) Demonstrate the preventive maintenance procedures for quipment and machines (reverse osmosis machine, distiller, autoclave, de-ionizer etc.)	Preventive maintenance procedures for equipment and machines in facility-based pharmaceutical preparation unit explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
3.1.1 Describe fundamental principles, concepts and importance of microbiology in pharmacy practice	a) Define terms used in microbiology b) Explain the history and development of microbiology c) Differentiate between eukaryotic and prokaryotic cells d) Explain classification and nomenclature of microorganisms e) Explain the importance of microorganisms in pharmacy	Fundamental principles, concepts and importance of microbiology in pharmacy practice described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
3.1.2 Describe bacteriology, virology, parasitology and mycology of medical and pharmaceutical importance	a) Define terms used in bacteriology b) Describe bacterial occurrences and distributions c) Describe the structure of a bacterial cell	Bacteriology, virology, parasitology and mycology of medical and pharmaceutical importance described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessmen Instrument
-	organelles/structures			
	e) Describe various drug targets in the bacterial cell			
	f) Classify bacterial according to staining properties, nutritional requirements and morphology			
	g) Describe common bacterial diseases (causative agents, transmission, signs and symptoms)			
	h) Define common terms used in virology			
	i) Describe general structure and properties of viruses			
	j) Classify viruses according to their genetic and morphological properties			
	k) Describe viral-host-cell interaction and replication			
	l) List various drug targets in virus			
	m) Describe common viral diseases (causative agents, transmission, signs and symptoms)			
	n) Define common terms used in mycology			
	o) Describe occurrences and distributions of fungi			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	fungal cell			
	q) Classify fungi based on their sexual spores (zygomycota, Ascomycota, basidiomycotina, deuteromycota)			
	r) Classify and describe common mycoses (causative agents, transmission, signs and symptoms)			
	s) Define common terms used in parasitology			
	t) Classify and list general characteristics of parasites			
	u) Describe reproduction and life cycles of parasites of medical importance			
	v) Describe causative agents, transmission, life cycle, signs/symptoms of common diseases caused blood and tissue protozoa (Malaria, Toxoplamosis, Trypanosomiasis)			
	w) Describe causative agents, transmission, life cycle, signs/symptoms of common diseases caused intestinal			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessmo Instrumen
	Cryptosporidiosis, Trichomoniasis)			
	x) Describe causative agents, transmission, life cycle, signs/symptoms of common diseases caused by helminths (Taenia, Schistosoma, pinworm, whipworm, y) hookworm, intestinal roundworm, filarial worm)			
3.1.3 Describe management of common bacterial, viral, fungal and parasitic diseases	a) Describe treatment, prevention and control of common bacterial diseases	Management of common bacterial, viral, fungal and parasitic diseases described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Describe treatment, prevention and control of common viral diseases			
	c) Describe treatment, prevention and control of common fungal diseases			
	d) Describe treatment, prevention and control of common protozoa diseases			
	e) Describe treatment, prevention and control of common helminthic diseases			
3.2.1 Explain principles of antisepsis, disinfection and	a) Define sterilisation	Principles of antisepsis, disinfection	Oral questioning Written tests	Checklist Question papers and
	b) Distinguish between			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	antisepsis	explained		Assignment report
	c) Outline procedures for disinfection and sterilisation of pharmaceutical equipment			
	d) List factors affecting sterilisation and disinfection			
3.2.2. Describe conditions requiring antisepsis and disinfection	a) List criteria for selection of antiseptics	Conditions requiring antisepsis and disinfection described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List criteria for selection of disinfectants			
	c) Identify factors affecting action of antiseptics and disinfectants			
3.2.3 Describe methods and agents used in sterilisation	a) List methods used for sterilization	Various diseases, their epidemiology and control measures are correctly explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain (dry and moist) heat sterilisation			
	c) Explain gaseous sterilisation			
	d) Explain radiation sterilisation			
	e) Explain sterilization by filtration			
	f) List the criteria for selecting sterilization method			
3.3.1 Explain concepts of preserving pharmaceutical products	a) Define preservative as used in pharmacy	Principles of microbial pathogenicity are correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain the concept of preservation in pharmacy			
	c) Describe factors affecting action of			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessm Instrum
	d) List ideal properties of antimicrobial preservatives			
3.3.2. Describe agents used in preservation of pharmaceutical products	a) List agents commonly used as antimicrobial preservative for pharmaceutical products	Agents used in preservation of pharmaceutical products described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List the criteria for selection of antimicrobial preservatives			
	c) List the limitations for use of antimicrobial preservatives			
3.3.3 Describe procedures for quality testing of pharmaceutical products	a) List methods commonly used for quality testing of pharmaceutical products from monographs	Procedures for quality testing of pharmaceutical product described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain procedures for carrying out physical quality tests for solid pharmaceutical dosage forms (Hardness, smell, colour, texture, thickness, diameter, friability, disintegration etc.)			
	c) Explain procedures for carrying out physical quality tests for liquid pharmaceutical dosage forms (pH, smell, colour, conductivity, osmolarity etc.)			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	d) Explain procedures for carrying out microbiological quality tests for pharmaceutical products (sterility tests, etc.)			
	e) Explain procedures for carrying out chemical qualitative tests (volumetric analysis, colour reaction, dissolution test etc.)			
	f) Explain the procedures for carrying out chromatographic quality tests (TLC, etc.)			
3.4.1. Describe concept of immunology and immunization	a) Describe terms used in immunology and immunization	Concept of immunology and immunization correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain types of immunity			
	c) Differentiate between antigens and antibodies			
	d) Explain sources of antibodies			
	e) Classify antibodies			
	f) Explain types and functions of lymphocytes			
	g) Explain the concept of expanded programme on immunization			
	h) List objectives of vaccination/			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instrument
-	i) Explain schedules of immunization in Tanzania			
3.4.2. Describe immunological preparations	a) Define vaccines and sera	Immunological preparations described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List immunological preparations			
	c) Differentiate between vaccine and sera			
	d) List characteristics of immunological preparations			
	e) List components of vaccines and sera			
	f) Classify vaccines and list their characteristics			
3.4.3. Describe procedures of handling immunological products	a) Define cold chain	Procedures of handling immunological products correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List components of cold chain			
	c) List equipment for cold chain			
	d) Explain the procedure for arrangement of vaccines in the refrigerator			
	e) List tools for monitoring cold chain			
	f) List factors affecting quality of vaccines			
	g) List indications and contraindications to vaccines			
	h) Explain strategies for vaccine delivery			
4.1.1 Describe pharmacokinetics of essential medicines.	a) Define common terms used in pharmacokinetics	Pharmacokinetics of essential medicines correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain drug absorption			
	c) Explain drug distribution			
	d) Explain drug			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	e) Explain drug elimination			
4.1.2 Describe pharmacodynamics of essential medicines	a) Define common terms used in pharmacodynamics	Pharmacodynamics of essential medicines correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain drug receptor interactions			
	c) Explain the concept enzyme inhibitors and enzyme inducers			
	d) Explain mechanism of action of drugs acting on the CNS			
	e) Explain mechanism of action of drugs acting on the cardiovascular system			
	f) Explain mechanism of action of drugs acting on the endocrine system			
	g) Explain mechanism of action of drugs acting on respiratory system			
	h) Explain mechanism of action of drugs acting on gastrointestinal system			
	i) Explain mechanism of action of analgesics, antipyretics and antiinflammatory drugs			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessm Instrum
	acting locally on the skin			
	k) Explain mechanism of action of drugs used in insect bites, venomous snakes and anaphylactic shock			
	l) Explain mechanism of action of drugs that are antineoplastic and immunosuppressive			
	m) Explain mechanism of action of antimetabolites.			
	n) Explain mechanism of vitamins and minerals			
	o) Explain mechanism of action of drugs acting on the genital-urinal system			
	p) Explain mechanism of action for antiparasitic drugs (antiprotozoal, antihelminthics, antifungal, antibacterial, antiviral)			
4.1.3 Describe side effects, contraindications and adverse reactions of essential medicines	a) Differentiate between side effects, adverse drug reaction and contraindications of drugs	Side effects, adverse drug reaction and contraindications of groups of medicines described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain the importance of			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	contraindications in initiating therapy and choosing of appropriate medicines			
	c) List side effects and adverse reactions of essential medicines			
	d) Identify contraindications to essential drugs			
4.1.4 Describe concept of toxicology	a) Define terms used in toxicology	Concept of toxicology correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Differentiate between potency and efficacy			
	c) Explain the concept of graded drug response			
	d) Explain maximum effective concentration, minimum effective concentration and therapeutic window			
	e) Explain the concept of effective dose concentration			
	f) Explain the concept of minimum lethal dose concentrations			
	g) Classify types of poisons			
	h) List commonly used drugs that are susceptible to poisoning and their antidotes			
	i) Explain management of acute poisoning			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instrument
use of medicines and associated problems.	and irrational use of medicines b) Outline types of irrational use c) Explain factors contributing to irrational use d) Explain problems associated with irrational medicine usage e) Explain control measures for irrational medicines use.	of medicines and associated problems correctly described	Written tests Assignments	papers and marking scheme Assignment report
4.2.2. Explain essential medicines concept in promoting rational use of medicines.	a) Explain the concept of essential medicines b) List problems of national essential medicines list c) Relate essential medicines concept with promotion of rational medicines use d) Outline types of interventions in promoting rational medicines use e) Explain factors hindering promotion of rational medicines use. f) Explain the importance of the Standard Treatment Guidelines (STG) and the Essential Medicines List (EML) in reducing irrational use of medicines	Essential medicines concept in promoting rational use of medicines explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
4.2.3 Explain the	a) Explain legal	The role of	Oral	Checklist

Sub enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
promotions in supporting rational use of medicines.	marketing and promotion	promotions in supporting rational use of medicines described.	Assignments	marking scheme Assignment report
	b) Explain consequences of uncontrolled Medicines marketing and promotion			
	c) Explain the role of information in Medicines marketing and promotion			
	d) Identify ethical issues in Medicines marketing and promotion			
1.1 Describe procedures for handling controlled medicines	a) Define controlled substances and prescription only medicines	Procedures for handling controlled and prescription only medicines described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List and classify controlled substances			
	c) Explain requirements for storing controlled substances.			
1.2 Explain policies governing the handling of prescription only medicines	a) Define term prescription only medicines	Policies governing the handling of prescription only medicines are correctly explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain sections of the Pharmacy Act, 2011 regulating the use and sale prescription only medicines			
	c) Explain procedure for issuing prescription only medicines in emergency			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instrument
4.3.3 Explain legislation governing the handling of controlled medicines	a) Describe sections of the Tanzania Food and Cosmetics Act, 2003 regulating distribution and use of medicines and medical supplies	Legislation governing the handling of controlled medicines are correctly explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain sections of the Drugs and Prevention of Illicit Drugs Traffic Act, 1971 governing distribution and use of controlled substances			
	c) Explain sections of the drugs and prevention of illicit traffic in drugs Act, 1995 that explain the handling of controlled medicines			
	d) Explain strategies of preventing misuse of controlled substances			
5.1.1 Organize health related data using computer packages	a) Explain concepts of electronic data storage and arrangement	Health related data using computer packages are correctly organised	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Demonstrate electronic filing and application of security to electronic data			
	c) List methods of summarizing data (charts, graphs, tables, histogram)			
5.1.2 Analyse health related data using computer packages	a) Generate tables from simple health data using spreadsheet	Health related data using computer packages analysed	Oral questioning Written tests Assignments	Checklist Question papers and marking
	b) Generate charts			

Learning outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
promotions in supporting rational use of medicines.	marketing and promotion	promotions in supporting rational use of medicines described.	Assignments	marking scheme Assignment report
	b) Explain consequences of uncontrolled Medicines marketing and promotion			
	c) Explain the role of information in Medicines marketing and promotion			
	d) Identify ethical issues in Medicines marketing and promotion			
3.1 Describe procedures for handling controlled medicines	a) Define controlled substances and prescription only medicines	Procedures for handling controlled and prescription only medicines described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List and classify controlled substances			
	c) Explain requirements for storing controlled substances.			
3.2 Explain policies governing the handling of prescription only medicines	a) Define term prescription only medicines	Policies governing the handling of prescription only medicines are correctly explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain sections of the Pharmacy Act, 2011 regulating the use and sale prescription only medicines			
	c) Explain procedure for issuing prescription only medicines in emergency situations			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	data using spreadsheet			report
	c) Generate graphs and histogram from simple health data using spreadsheet			
	d) Generate trends from data and recognise problems to be solved using spreadsheet			
5.1.3 Report and present health related information using computer packages	a) Explain principles of report writing	Health related information correctly reported and presented using computer packages	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Deduce information from analysed data and summarise it			
	c) Generate presentation using computer packages			
5.1.4 Use computer applications for data backup, information searching and learning	a) Define data back up	Computer applications for data backup, information searching and learning are correctly used	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Describe importance of backing up data			
	c) Explain causes of data loss			
	d) Define a computer virus			
	e) Classify different type computer viruses			
	f) Describe importance of computer antiviruses			
	g) Demonstrate techniques in searching information on the internet			
5.1.5 Use computer packages in ordering, invoicing, dispensing, selling	a) List common inventory management applications	Computer packages in ordering, invoicing	Oral questioning Written tests Assignments	Checklist Question papers and marking

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instrument
management	procedures for electronic ordering c) Demonstrate procedures for electronic invoicing d) Demonstrate procedures for electronic dispensing e) Demonstrate procedures for electronic selling f) Carry out inventory management functions using computer	selling and inventory management are correctly used		Assignment report
5.2.1 Describe components of the WHO health management information system	a) Define health management system b) List components of the WHO health management system c) Explain the importance of health management system d) List key performance indicators of health management system	Components of the WHO health management information system correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
5.2.2 Use MTUHA database in capturing and managing pharmaceutical data	a) Define MTUHA b) List commonly used MTUHA tools c) Capture and process data using MTUHA database software d) Generate reports from MTUHA database	MTUHA database in capturing and managing pharmaceutical data correctly used	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
5.2.3 Perform simple data analysis using MTUHA database	a) Establish trends of pharmaceutical services from MTUHA database	Simple data analysis using MTUHA	Oral questioning Written tests	Checklist Question papers and

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	services problems from analysed data			report
	c) Prepare reports			
5.3.1 Describe the components of Integrated logistics system	a) Define Integrated Logistics System (ILS)	components of Integrated logistics system correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain the objectives and purpose of Logistics Management Information System (LMIS) in the context of Tanzania.			
	c) Differentiate between pull and push systems			
	d) List key features of the ILS system			
	e) List LMIS tools (e.g. R&R forms, etc.)			
	f) Complete R and R forms			
	g) Use Electronic Logistic Management Information system (eLMIS)			
5.3.2 Describe management of pharmaceutical information in vertical programmes	a) Define the term vertical programme	Management of pharmaceutical information in vertical programme described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Mention vertical programme existing in the country			
	c) Explain importance of pharmaceutical information management in vertical programmes			
5.3.3 Use networking programs in disseminating pharmaceutical	a) Explain the importance of networking in dissemination of pharmaceutical information	Networking programs in disseminating pharmaceutical information correctly used	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	b) List networking programmes used in dissemination of pharmaceutical information			report
	c) Disseminate pharmaceutical information			
6.1.1 Describe the concept of organic chemistry in pharmacy	a) Define organic chemistry	Chemical composition of antiseptics and disinfectants correctly described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List characteristics of organic compounds			
	c) Explain the importance of organic chemistry in pharmacy			
6.1.2 Describe classification of organic compounds and their structures	a) Classify and explain organic compounds			
	b) Explain nomenclature of organic compound			
	c) Draw chemical structures of organic compounds			
	d) List properties of different classes of organic compounds			
6.1.3 Describe chemical reactions involving organic compounds	a) Define term chemical reaction	Chemical reactions involving organic compounds described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List types of chemical reactions in organic compounds			
	c) Explain chemical reactions in organic compounds			
6.2.1 Describe basic structure and functions of plant parts	a) Explain structure of a plant cell b) List functions of plant cell	Basic structure and functions of plant parts described	Oral questioning Written tests Assignments	Checklist Question papers and marking

-enabling comes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	d) Explain basic plant tissues and tissue systems			
	e) Explain plant morphology and functions (roots, stem, leaves, flowers, fruits, seeds and barks)			
.2.2 Describe atural sources of lrugs	a) List sources of drugs	Natural sources of drugs described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain natural sources of drugs			
	c) Explain the importance of plant as a major source of drugs			
	d) List available plants commonly used as source of drugs in Tanzania			
6.2.3 Explain the importance and use of natural sources of drugs in pharmacy practice	a) Explain social influences on cultivation of medicinal plants	The importance and use of natural sources of drugs in pharmacy practice explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain economic influences on cultivation of medicinal plants			
	c) List common misuse of medicinal plants			
6.2.4 Explain cultivation, distribution, collection and storage of medicinal plants	a) Classify medicinal plants	Cultivation, distribution, collection and storage of medicinal plants explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Explain methods used in cultivation of medicinal plants			
	c) List factors influencing cultivation of medicinal plants			
	d) List methods for collection medicinal drugs			
	e) Explain storage of			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	g) Explain adulteration of crude drugs			
	h) Explain evaluation of crude drugs			
6.2.5 Explain methods for processing and extraction of active medicinal principals from natural sources	a) Explain the importance of processing medicinal plants	Methods for processing and extraction of active medicinal principals from natural sources explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List methods of extraction of crude drugs			
	c) List solvents used in extraction			
	d) Explain method of drying of crude drugs			
6.2.6 Identify medicinal plants containing toxic substances.	a) List plants containing toxic substances	Medicinal plants containing toxic substances identifies	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) Classify plants containing toxic substances			
	c) List toxic elements/principals in medicinal plants			
6.2.7 Describe active medicinal principals from natural sources	a) List sources of active principals from medicinal plants (alkaloids, glycosides, volatile oils, fixed oils, fats etc.)	Active medicinal principals from natural sources described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
	b) List uses of active principals from medicinal plants (alkaloids, glycosides, volatile oils, fixed oils, fats etc.)			
	c) List sources and uses of active principals from			

Sub-enabling outcomes	Related Tasks	Assessment Criteria	Assessment Methods	Assessment Instruments
	d) List sources and uses of active principals from minerals			
6.3.1 Explain the concept of isomerism	a) Define isomer and isomerism b) List and explain types of isomers c) Explain the importance of isomerism in pharmacy	Concept of isomerism explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
6.3.2 Explain biotransformation methods of medicinal products	a) Define biotransformation b) Explain metabolism of different organic compounds c) Explain the importance of biotransformation	Biotransformation methods of medicinal products explained	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report
6.3.3 Describe structure-activity relationship of drugs	a) Define structure-activity relationship b) Explain the importance of structure-activity relationship in pharmacy c) Classify drugs according to their chemical nature d) Relate organic structures of penicillins, quinolones, cephalosporin and sulphonamides, aspirin and paracetamol	Structural-activity relationship of medicines described	Oral questioning Written tests Assignments	Checklist Question papers and marking scheme Assignment report

11.2 Benchmarking of Assessment Criteria

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN.....		
	SASTIFACTORY	GOOD	EXCELLENT
1.1.1 Describe the purpose of health supply chain management.	Define supply chain in relation to management of medicines and medical supplies	Define supply chain in relation to management of medicines and medical supplies	Define supply chain in relation to management of medicines and medical supplies
	List the components of health supply chain management	List the components of health supply chain management Explain the components of health supply chain management	List the components of health supply chain management Explain the components of health supply chain management
	Explain the components of health supply chain management	Define selection in relation to medicines and medical supplies ,Explain importance of medicines and medical supplies selection and Mentions criteria for selection of medicines and medical supplies	Define selection in relation to medicines and medical supplies, Explain importance of medicines and medical supplies selection, Mention criteria for selection of medicines and medical supplies and Lists problems facing selection of medicines and medical supplies
1.1.2 Describe quantification methods and forecasting of medicines	Define terms quantification and forecasting as applied in medicines and medical supplies. List objectives of quantification	Define terms quantification and forecasting as applied in medicines and medical supplies, List objectives of quantification and List and explain methods of quantification.	Define terms quantification and forecasting as applied in medicines and medical supplies, List objectives of quantification, List and explain methods of quantification, explains application of the quantification methods and describes issues to consider in quantification.
1.1.3 Describe procurement	Define terms used in procurement of	Define terms used in procurement of	Define terms used in procurement of

SUB-ENABLING OUTCOMES		BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN.....		
		SASTIFACTORY	GOOD	EXCELLENT
	medicines and medical supplies	medical supplies, List objectives of good procurement, List operation principles for good procurement, List operation principles for good procurement and Mention good procurement practices for medicines and medical supplies	supplies, List objectives of good procurement, List operation principles for good procurement, and List operation principles for good procurement. Mention good procurement practices for medicines and medical supplies, List steps in the procurement cycle, List methods for procurement of medicines and medical supplies and Identify criteria for selecting a procurement methods	medical supplies, List objectives of good procurement, List operation principles for good procurement, List operation principles for good procurement, Mention good procurement practices for medicines and medical supplies, List steps in the procurement cycle, List methods for procurement of medicines and medical supplies, Identify criteria for selecting a procurement methods, List sources of medicines and medical supplies for procurement, Explain the quality assurance in procurement of medicines and medical supplies and Explain drug donation and list its associated benefits and problems
1.2.1	Explain legislations governing procurement of medicines and medical supplies	Explain sections of the Public Procurement Act, 2011 regulating procurement of medicines and medical supplies	Explain sections of the Public Procurement Act, 2011 regulating procurement of medicines and medical supplies and Describe sections of the Tanzania Food and Cosmetics Act, 2003 regulating procurement of medicines and	Explain sections of the Public Procurement Act, 2011 regulating procurement of medicines and medical supplies, Describe sections of the Tanzania Food and Cosmetics Act, 2003 regulating procurement of

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN		
	SASTIFACTORY	GOOD	EXCELLENT
			the Medical Stores Department Act 1[illegible] regulating procurement of medicines and medical supplies
1.2.2 Explain legislations governing procurement of controlled substances	Classify controlled substances and Describe sections of the Tanzania Food and Cosmetics Act, 2003 regulating procurement of medicines and medical supplies.	Classify controlled substances, Describe sections of the Tanzania Food and Cosmetics Act, 2003 regulating procurement of medicines and medical supplies and Explain sections of the Drugs and Prevention of Illicit Drugs Traffic Act, 1971 governing procurement of controlled substances	Classify controlled substances, Describe sections of the Tanzania Food and Cosmetics Act, 2003 regulating procurement of medicines and medical supplies, Explain sections of the Drugs and Prevention of Illicit Drugs Traffic Act, 1971 governing procurement of controlled substances and Explain international conventions ratified in the United Republic of Tanzania regarding controlled drugs and psychotropic substances.
1.2.3 Explain major procurement agencies for medicines and medical supplies	List major procurement agencies for medicines and medical supplies in Tanzania and Explain the structure and functions of Medical stores Department	List major procurement agencies for medicines and medical supplies in Tanzania, Explain the structure and functions of Medical stores Department and Explain the Autonomous supply agencies for public and private procurement of medicines (MEMS, action Medeor etc.)	List major procurement agencies for medicines and medical supplies in Tanzania. Explain the structure and functions of Medical stores Department, explain Autonomous supply agencies for public and private procurement of medicines (MEMS, action Medeor etc.)

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN.....		
	SASTIFACTORY	GOOD	EXCELLENT
3.1 Explain national drug/medicine policy in relation to pharmaceutical services	Define national drug policy.	Define national drug policy, Outline objectives of the national drug/medicine policy and Outline objectives of the national drug/medicine policy.	Define national drug policy, List goals of national drug policy, Outline objectives of the national drug/medicine policy, List components of drug/medicine policy and explain the importance of the Standard Treatment Guidelines
.3.2 Explain policies and guidelines governing procurement of medicines for HIV/AIDS, TB and Leprosy.	List the vertical programmes existing in Tanzania	List the vertical programmes existing in Tanzania. And Explain procedure for procuring medicines for vertical programmes	List the vertical programmes existing in Tanzania, Explain procedure for procuring medicines for vertical programmes and List objectives of NACP, Malaria and TB& Leprosy programmes
1.3.3 Explain policies and guidelines governing procurement of medicines and medical supplies for vertical programmes	Explain procedure for procurement of medicines for vertical programmes.	List objectives of vertical programmes existing in Tanzania and Explain procedure for procurement of medicines for vertical programmes	List objectives of vertical programmes existing in Tanzania, Explain procedure for procurement of medicines for vertical programmes and Explain the role of vertical programme in enhancing access to medicines
2.1.1 Explain the principles of Good Manufacturing Practices.	List principles of GMP	Define Good Manufacturing Practices and List principles of GMP	Define Good Manufacturing Practices ,List principles of GMP and Explain the importance of GMP in pharmaceutical manufacturing
2.1.2 Explain components of Good Manufacturin	List the Components of GMP, Explain premise requirements and	List the Components of GMP, Explain premise requirements, Explain raw materials	List the Components of GMP, Explain premise requirements, Explain personnel requirements, Explain

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN.....		
	SASTIFACTORY	GOOD	EXCELLENT
	requirements	Explain documentation requirements.	raw materials requirements, Explain documentation requirements and Explain equipment requirements
2.1.3 Describe quality control and assurance in relation to preparation of pharmaceutical products	Define quality assurance and List functions of quality control laboratory in relation to preparation of pharmaceutical products.	Define quality assurance, Define quality Control and List functions of quality control laboratory in relation to preparation of pharmaceutical products.	Define quality assurance, Define quality Control, List functions of quality control laboratory in relation to preparation of pharmaceutical products and .....
2.2.1 Describe sterile pharmaceutical preparations	List qualities of sterile pharmaceutical products.	Pharmaceutical products and Explain categories of sterile pharmaceutical products	Define sterile pharmaceutical products, Explain categories of sterile pharmaceutical products, List qualities of sterile pharmaceutical products and explain the role of aseptic techniques in assuring quality in pharmaceutical production
2.2.2 Describe requirements for preparation of sterile pharmaceutical products	Explain the concept of aseptic processing,	Explain the concept of aseptic processing,	Explain the concept of aseptic processing ,
	Explain premise requirements for sterile production, and	Explain premise requirements for sterile production,	Explain premise requirements for sterile production,
	Explain raw materials requirements for sterile production	Explain personnel requirements for sterile production,	Explain personnel requirements for sterile production,

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN.....		
	SASTIFACTORY	GOOD	EXCELLENT
		Explain raw materials requirements for sterile production and Explain documentation requirements for sterile production	Explain raw materials requirements for sterile production; Explain documentation requirements for sterile production and Explain equipment requirements for sterile production.
2.2.3 Use formula in the preparation of pharmaceutical products	Identify formula for pharmaceutical preparation, Reduce or enlarge official formula to obtain required formula for compounding and Compound semi-solid preparations (ointments, creams, gels, pastes etc.)	Define monographs, Identify formula for pharmaceutical preparation, Reduce or enlarge official formula to obtain required formula for compounding and Compound semi-solid preparations (ointments, creams, gels, pastes etc.)	Define monographs, List different types of references used in pharmaceutical production, Identify formula for pharmaceutical preparation, Reduce or enlarge official formula to obtain required formula for compounding and Compound semi-solid preparations (ointments, creams, gels, pastes etc.)
2.2.4 Describe formulation of semi-solid pharmaceutical preparations	Define semisolid pharmaceutical preparations, List ideal properties of semi-solid preparations, Explain factors affecting percutaneous absorption, Explain the components of semi-solid preparations (ointments, creams, pastes, gels etc.) and Explain containers, closures and labelling of semi-solid preparations.	List ideal properties of semi-solid preparations, Explain percutaneous absorption, Explain rational approaches to topical formulation, List treatment target for semi-solid preparations, Explain the components of semi-solid preparations (ointments, creams, pastes, gels etc.) and Explain containers, closures and labelling of semi-solid preparations	Define semisolid pharmaceutical preparations. List ideal properties of semi-solid preparations. Explain percutaneous absorption. Explain factors affecting percutaneous absorption. Explain rational approaches to topical formulation. List treatment target for semi-solid preparations. Explain the components of semi-solid preparations

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN		
	SASTIFACTORY	GOOD	EXCELLENT
			Explain containers, closures and labels of semi-solid preparations.
2.2.5 Perform calculations on isotonicity, electrolytes, constitutions, intravenous admixtures and rate of flow	Define terms used in isotonicity and electrolytes, Explain the importance of isotonic solutions, Perform calculations of isotonicity by freezing point methods, sodium chloride equivalent, and molecular concentrations and Calculate milliequivalents, millimoles, milliosmoles and osmolarity/osmolality.	Define terms used in isotonicity and electrolytes, Explain the importance of isotonic solutions, Perform calculations of isotonicity by freezing point methods, sodium chloride equivalent, and molecular concentrations, Calculate milliequivalents, millimoles, milliosmoles and osmolarity/osmolality and Perform calculations of constituted solutions, intravenous admixture and rate of flow.	Define terms used in isotonicity and electrolytes Explain the importance of isotonic solutions, Perform calculations of isotonicity by freezing point methods, sodium chloride equivalent and molecular concentrations, Calculate milliequivalents, millimoles, milliosmoles and osmolarity/osmolality, Perform calculations of constituted solutions, intravenous admixture and rate of flow and Perform calculations of pH, buffers and buffer solutions
2.3.1 Explain standard operating procedures of equipment and machines in facility-based pharmaceutical preparation unit	Explain the components of an SOP	Define standard operating procedures and explain the components of an SOP.	Define standard operating procedures, Explain the components of an SOP and explain the importance of SOP in the production of pharmaceuticals.
2.3.2 Explain the operating principles of equipment and	List equipment used in facility based pharmaceutical preparation unit	List equipment used in facility based pharmaceutical preparation unit	List equipment used in facility based pharmaceutical preparation unit

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN.....		
	SASTIFACTORY	GOOD	EXCELLENT
	Explain the operating principles of an autoclave and explain the operating principles of a reverse osmosis machine	Explain the operating principles of an autoclave, Explain the operating principles of a reverse osmosis machine and Explain the operating principles of a de-ionizer.	Explain the operating principles of an autoclave, Explain the operating principles of a reverse osmosis machine , Explain the operating principles of a de-ionizer and Explain the operating principles of a distiller.
2.3.3 Explain preventive maintenance procedures for equipment and machines in facility-based pharmaceutical preparation unit	Demonstrate the preventive maintenance of equipment and machines (reverse osmosis machine, distiller, autoclave, de-ionizer etc.)	Describe general considerations in preventive maintenance of machines and equipment and demonstrate the maintenance of equipment and machines (reverse osmosis machine, distiller, autoclave, de-ionizer etc.)	Explain the importance of proper preventive maintenance of equipment and machines, describe general considerations in preventive maintenance of machines and equipment and describe preventive maintenance procedures for equipment and machines (reverse osmosis machine, distiller, autoclave, de-ionizer etc.)
3.1.1 Describe fundamental principles, concepts and importance of microbiology in pharmacy practice	Define terms used in microbiology, Differentiate between eukaryotic and prokaryotic cells and Explain classification and nomenclature of microorganisms.	Differentiate between eukaryotic and prokaryotic cells, Explain classification and nomenclature of microorganisms and Explain the importance of microorganisms in pharmacy	Define terms used in microbiology, Explain the history and development of microbiology, Differentiate between eukaryotic and prokaryotic cells, Explain classification and nomenclature of microorganisms and explain the importance of microorganisms in pharmacy

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF / CAN		
	SASTIFACTORY	GOOD	EXCELL
3.1.2 Describe bacteriology, virology, parasitology and mycology of medical and pharmaceutical importance	Define terms used in bacteriology, Describe bacterial occurrences and distributions, Describe the structure of a bacterial cell, List functions of different bacterial organelles/structures, Describe various drug targets in the bacterial cell, Classify bacterial according to staining properties, nutritional requirements and morphology, Describe common bacterial diseases (causative agents, transmission, signs and symptoms), Define common terms used in virology, Classify viruses according to their genetic and morphological properties, List various drug targets in virus, Describe common viral diseases (causative agents, transmission, signs and symptoms), Define common terms used in mycology, Describe occurrences and distributions of fungi and Describe the	Define terms used in bacteriology, Describe bacterial occurrences and distributions, Describe the structure of a bacterial cell, List functions of different bacterial organelles/structures, Describe various drug targets in the bacterial cell, Classify bacterial according to staining properties, nutritional requirements and morphology, Describe common bacterial diseases (causative agents, transmission, signs and symptoms), Define common terms used in virology, Describe general structure and properties of viruses, Classify viruses according to their genetic and morphological properties, Describe viral-host-cell interaction and replication List various drug targets in virus, Describe common viral diseases (causative agents, transmission, signs and symptoms), Define common terms used in mycology, Describe occurrences and distributions of	Define terms bacteriology Describe bac occurrences distributions Describe the of a bacterial List functions different bac organelles/str describe vario targets in the cell, Classify bac according to properties, nu requirements morphology, Describe com bacterial dise (causative ag transmission, and symptoms Define comm used in virolo Describe gen structure and properties of Classify viru according to genetic and morphological properties, Describe viral interaction and replication, List various dru targets in viru Describe comm viral diseases (causative ag transmission, and symptoms Define comm used in mycolo Describe occur

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN.....		
	SASTIFACTORY	GOOD	EXCELLENT
	structure of a fungal cell	fungi, Describe the structure of a fungal cell, Classify fungi based on their sexual spores (zygomycota, Ascomycota, basidiomycotina, deuteromycota), Classify and describe common mycoses (causative agents, transmission, signs symptoms) and Define common terms used in parasitology	and distributions of fungi, Describe the structure of a fungal cell, Classify fungi based on their sexual spores (zygomycota, Ascomycota, basidiomycotina, deuteromycota), Classify and describe common mycoses (causative agents, transmission, signs and symptoms), Define common terms used in parasitology, Classify and list general characteristics of parasites, Describe reproduction and life cycle of parasites, Describe causative agents, transmission, life cycle, signs/symptoms of common diseases caused blood and tissue protozoa (Malaria, Toxoplamosis, Trypanosomiasis), Describe causative agents, transmission, life cycle, signs/symptoms of common diseases caused intestinal and urogenital protozoa (Giardiasis, Amoebiasis, Cryptosporidiosis, Trichomoniasis) and

SUB-ENABLING OUTCOMES	BENCH MARK A LEANER HAS ABILITY TO / KNOWLEGDE OF/ CAN.....		
	SASTIFACTORY	GOOD	EXCELLENT
			common diseases caused by helminths (Taenia, Schistosoma, pinworm, whipworm, hookworm, intestinal roundworm, filarial worm)
3.1.3 Describe management of common bacterial, viral, fungal and parasitic diseases	Describe treatment, prevention and control of common bacterial diseases, Describe treatment, prevention and control of common viral diseases and Describe treatment, prevention and control of common fungal diseases	Describe treatment, prevention and control of common bacterial diseases Describe treatment, prevention and control of common viral diseases Describe treatment, prevention and control of common fungal diseases and Describe treatment, prevention and control of common protozoa diseases	Describe treatment, prevention and control of common bacterial diseases Describe treatment, prevention and control of common viral diseases Describe treatment, prevention and control of common fungal diseases Describe treatment, prevention and control of common protozoa diseases Describe treatment, prevention and control of common helminthic diseases
3.2.1 Explain principles of antisepsis, disinfection and sterilisation	Distinguish between sterilisation, disinfection and, antisepsis, and Outline procedures for disinfection and sterilisation of pharmaceutical equipment	Define sterilisation Distinguish between sterilisation, disinfection and, antisepsis Outline procedures for disinfection and sterilisation of pharmaceutical equipment	Define sterilisation Distinguish between sterilisation, disinfection and, antisepsis Outline procedures for disinfection and sterilisation of pharmaceutical equipment List factors affecting sterilisation and disinfection

3.2.2 Describe conditions requiring antisepsis and disinfection	List criteria for selection of disinfectants	List criteria for selection of antiseptics and List criteria for selection of disinfectants	List criteria for selection of antiseptics, List criteria for selection of disinfectants and Identify factors affecting action of antiseptics and disinfectants,
3.2.3 Describe methods and agents used in sterilisation	List methods used for sterilization, Explain (dry and moist) heat sterilisation and Explain gaseous sterilisation	List methods used for sterilization, Explain (dry and moist) heat sterilisation ,Explain gaseous sterilisation, Explain radiation sterilisation and Explain sterilization by filtration	List methods used for sterilization, Explain (dry and moist) heat sterilisation, Explain gaseous sterilisation, Explain radiation sterilisation, Explain sterilization by filtration and List the criteria for selecting sterilization method
3.3.1 Explain concepts of preserving pharmaceutical products	Define preservative as used in pharmacy and Explain the concept of preservation in pharmacy	Define preservative as used in pharmacy, Explain the concept of preservation in pharmacy and describe factors affecting action of antimicrobial preservatives	Define preservative as used in pharmacy, Explain the concept of preservation in pharmacy, Describe factors affecting action of antimicrobial preservatives and List ideal properties of antimicrobial preservatives
3.3.2 Describe agents used in preservation of pharmaceutical products	List agents commonly used as antimicrobial preservative for pharmaceutical products	List agents commonly used as antimicrobial preservative for pharmaceutical products and the criteria for selection of antimicrobial preservatives	List agents commonly used as antimicrobial preservative for pharmaceutical products, List the criteria for selection of antimicrobial preservatives and limitations for use of antimicrobial

3.3.3	Describe procedures for quality testing of pharmaceutical products	List methods commonly used for quality testing of pharmaceutical products from monographs, Explain procedures for carrying out physical quality tests for solid pharmaceutical dosage forms (Hardness, smell, colour, texture, thickness, diameter, friability, disintegration etc.) and Explain procedures for carrying out physical quality tests for liquid pharmaceutical dosage forms (pH, smell, colour, conductivity, osmolarity etc.)	List methods commonly used for quality testing of pharmaceutical products from monographs, Explain procedures for carrying out physical quality tests for solid pharmaceutical dosage forms (Hardness, smell, colour, texture, thickness, diameter, friability, dissolution, disintegration etc.), Explain procedures for carrying out physical quality tests for liquid pharmaceutical dosage forms (pH, smell, colour, conductivity, osmolarity etc, Explain procedures for carrying out microbiological quality tests for pharmaceutical products (sterility tests, etc.) and Explain procedures for carrying out	List methods commonly used quality testing of pharmaceutical products from monographs, Explain procedu carrying out phy quality tests for pharmaceutical dosage forms (Hardness, smell colour, texture, thickness, diame friability, dissolut disintegration etc Explain procedur carrying out phys quality tests for li pharmaceutical dosage forms (p smell, colour, conductivity, osmolarity etc.), Explain procedur carrying out microbiological q tests for pharmaceutical products (sterility tests, etc.), Explain procedur carrying out chem qualitative tests (volumetric analys colour reaction, dissolution test etc and Explain the procedures for carrying out chromatographic quality tests (TLC, etc.)
3.4.1	Describe concept of immunology and immunization	Describe terms used in immunology and immunization, Explain types of immunity	Describe terms used in immunology and immunization, Explain types of immunity,	Describe terms use in immunology and immunization, Explain types of immunity,

	antigens and antibodies, Explain sources of antibodies, Classify antibodies Explain types and functions of lymphocytes and Explain the concept of expanded programme on immunization.	antigens and antibodies Explain sources of antibodies, Classify antibodies Explain types and functions of lymphocytes, Explain the concept of expanded programme on immunization and List objectives of vaccination/ immunisation programme.	antigens and antibodies, Explain sources of antibodies, Classify antibodies Explain types and functions of lymphocytes , Explain the concept of expanded programme on immunization, Explain schedules of immunization in Tanzania and List objectives of vaccination/ immunisation programme.
3.4.2 Describe immunologic al preparations	Differentiate between vaccine and sera, List characteristics of immunological preparations and components of vaccines and sera	Define vaccines and sera, List immunological preparations, Differentiate between vaccine and sera, List characteristics of immunological preparations and components of vaccines and sera	Define vaccines and sera, List immunological preparations, Differentiate between vaccine and sera, List characteristics of immunological preparations, List components of vaccines and sera and Classify vaccines and list their characteristics
3.4.3 Describe procedures of handling immunologic al products	Define cold chain, List equipment for cold chain, Explain the procedure for arrangement of vaccines in the refrigerator and List factors affecting quality of vaccines	Define cold chain, List components of cold chain, List equipment for cold chain, Explain the procedure for arrangement of vaccines in the refrigerator, List tools for monitoring cold chain and List factors affecting quality of vaccines	Define cold chain, List components of cold chain, List equipment for cold chain Explain the procedure for arrangement of vaccines in the refrigerator, List tools for monitoring cold chain, List factors affecting quality of vaccines, List indications and contraindications to vaccines and explain strategies for vaccine

4.1.1 Describe pharmacokinetics of essential medicines.	Define common terms used in pharmacokinetics, Explain drug absorption, and Explain drug metabolism	Define common terms used in pharmacokinetics, Explain drug absorption, Explain drug distribution and explain drug metabolism.	Define common terms used in pharmacokinetics, Explain drug absorption, Explain drug distribution, Explain drug metabolism and explain drug elimination
4.1.2 Describe pharmacodynamics of essential medicines	Define common terms used in pharmacodynamics, Explain drug receptor interactions, Explain the concept enzyme inhibitors and enzyme inducers, Explain mechanism of action of drugs acting on the CNS, Explain mechanism of action of drugs acting on the cardiovascular system, Explain mechanism of action of drugs acting on respiratory system Explain mechanism of action of drugs acting on gastrointestinal system, Explain mechanism of action of analgesics, antipyretics and anti-inflammatory drugs and explain mechanism of action of drugs used in insect bites, venomous snakes and anaphylactic shock	Define common terms used in pharmacodynamics, Explain drug receptor interactions, Explain the concept enzyme inhibitors and enzyme inducers, Explain mechanism of action of drugs acting on the CNS, Explain mechanism of action of drugs acting on the cardiovascular system, Explain mechanism of action of drugs acting on the endocrine system, Explain mechanism of action of drugs acting on respiratory system, Explain mechanism of action of drugs acting on gastrointestinal system, Explain mechanism of action of analgesics, antipyretics and anti-inflammatory drugs, Explain mechanism of action of drugs acting locally on the skin, Explain mechanism of action of drugs that are antineoplastic and immunosuppressive and,	Define common terms used in pharmacodynamics, Explain drug receptor interactions, Explain the concept enzyme inhibitors and enzyme inducers, Explain mechanism of action of drugs acting on the CNS, Explain mechanism of action of drugs acting on the cardiovascular system, Explain mechanism of action of drugs acting on the endocrine system, Explain mechanism of action of drugs acting on respiratory system, Explain mechanism of action of drugs acting on gastrointestinal system, Explain mechanism of action of analgesics, antipyretics and anti-inflammatory drugs, Explain mechanism of action of drugs acting locally on the skin, Explain mechanism of action of drugs used in insect bites, venomous snakes and

		antihelminthics, antifungal, antibacterial, antiviral	immunosuppressive, Explain mechanism of action of antimetabolites, Explain mechanism of vitamins and minerals, Explain mechanism of action of drugs acting on the genital-urinal system, and explains mechanism of action for antiparasitic drugs (antiprotozoal, antihelminthics, antifungal, antibacterial, antiviral)
4.1.3 Describe side effects, contraindications and adverse reactions of essential medicines	Differentiate between side effects, adverse drug reaction and contraindications of drugs and can List side effects and adverse reactions of essential medicines.	Differentiate between side effects, adverse drug reaction and contraindications of drugs, List side effects and adverse reactions of essential medicines and can Identify contraindications to essential drugs.	Differentiate between side effects, adverse drug reaction and contraindications of drugs, Explain the importance of effects, adverse drug reaction and contraindications in initiating therapy and choosing of appropriate medicines, List side effects and adverse reactions of essential medicines and can Identify contraindications to essential drugs.
4.1.4 Describe concept of toxicology	Define terms used in toxicology, Differentiate between potency and efficacy, Explain the concept of graded drug response, List commonly used drugs that are susceptible to poisoning and their antidotes and, Explain management of acute poisoning	Define terms used in toxicology, Differentiate between potency and efficacy, Explain the concept of graded drug response, Explain maximum effective concentration, minimum effective concentration and therapeutic window, Explain the concept of effective dose concentration, List commonly used drugs that are	Define terms used in toxicology, Differentiate between potency and efficacy, Explain the concept of graded drug response, Explain maximum effective concentration, minimum effective concentration and therapeutic window, Explain the concept of effective dose concentration,

		susceptible to poisoning and their antidotes and can explain management of acute poisoning	minimum lethal concentration, Classify types of poisons and List commonly drugs that are susceptible to poisoning and their antidotes and can management of poisoning.
4.2.1 Describe causes of irrational use of medicines and associated problems.	Differentiate between rational and irrational use of medicines, Outline types of irrational use and explain factors contributing to irrational use.	Differentiate between rational and irrational use of medicines, Outline types of irrational use, Explain factors contributing to irrational use and problems associated with irrational medicine usage.	Differentiate between rational and irrational use of medicines, Outline types of irrational use, Explain factors contributing to irrational use, Explain problems associated with irrational medicine usage and control measures for irrational medicines use.
4.2.2 Explain essential medicines concept in promoting rational use of medicines.	Explain the concept of essential medicines, List problems of national essential medicines list, and Relate essential medicines concept with promotion of rational medicines use	Explain the concept of essential medicines, List problems of national essential medicines list, Relate essential medicines concept with promotion of rational medicines use and Outline types of interventions in promoting rational medicines use	Explain the concept essential medicines, List problems of national essential medicines list, Relate essential medicines concept with promotion of rational medicines use, Outline types of interventions in promoting rational medicines use, Explain factors hindering promotion of rational medicines use and Explain the importance of the Standard Treatment Guidelines (STG) in reducing irrational use of medicines

4.2.3 Explain the role of Medicines marketing and promotions in supporting rational use of medicines.	Explain legal limitations on Medicines marketing and promotion and Explain consequences of uncontrolled Medicines marketing and promotion	Explain legal limitations on Medicines marketing and promotion, Explain consequences of uncontrolled Medicines marketing and promotion and Identify ethical issues in Medicines marketing and promotion	Explain legal limitations on Medicines marketing and promotion, Explain consequences of uncontrolled Medicines marketing and promotion, Explain the role of information in Medicines marketing and promotion and Identify ethical issues in Medicines marketing and promotion
4.3.1 Describe procedures for handling controlled medicines	List and classify controlled substances	Define controlled substances and prescription only medicines, they can list and classify controlled substances	Define controlled substances and prescription only medicines, List and classify. controlled substances and Explain requirements for storing controlled substances.
4.3.2 Explain policies governing the handling of prescription only medicines	Explain procedure for issuing prescription only medicines in emergency situations	Define term prescription only medicines and, Explain procedure for issuing prescription only medicines in emergency situations	Define term prescription only medicines, Explain sections of the Pharmacy Act, 2011 regulating the use and sale prescription only medicines and Explain procedure for issuing prescription only medicines in emergency situations
4.3.3 Explain legislation governing the handling of controlled medicines	Explain sections of the Drugs and Prevention of Illicit Drugs Traffic Act, 1971 governing distribution and use of controlled substances and, Explain strategies of preventing misuse of	Describe sections of the Tanzania Food and Cosmetics Act, 2003 regulating distribution and use of medicines and medical supplies, Explain sections of the Drugs and Prevention of Illicit Drugs Traffic Act, 1971 governing	Describe sections of the Tanzania Food and Cosmetics Act, 2003 regulating distribution and use of medicines and medical supplies, Explain sections of the Drugs and Prevention of Illicit Drugs Traffic

	controlled substances	distribution and use of controlled substances, and Explain strategies of preventing misuse of controlled substances	Act, 1971 [illegible] distribution and [illegible] controlled substa[illegible] Explain sections [illegible] drugs and preven[illegible] of illicit traffic in [illegible] Act, 1995 that [illegible] the handling of controlled medic[illegible] and Explain strat[illegible] of preventing misu[illegible] of controlled substances
5.1.1 Organize health related data using computer packages	Demonstrate electronic filing and application of security to electronic data	Demonstrate electronic filing and application of security to electronic data and List methods of summarizing data (charts, graphs, tables, histogram)	Explain concepts [illegible] electronic data [illegible] and arrangement Demonstrate electronic filing and application of [illegible] to electronic data [illegible] List methods of summarizing data (charts, graphs, tables, histogram)
5.1.2 Analyse health related data using computer packages	Generate tables and charts from simple health data using spreadsheet	Generate tables and charts from simple health data using spreadsheet and Generate trends from data and recognise problems to be solved using spreadsheet	Generate tables, graphs, histograms and charts from simple health data using spreadsheet and [illegible] generate trends from data and recognise problems to be solved using spreadsheet
5.1.3 Report and present health related information using computer packages	Explain principles of report writing	Explain principles of report writing and, Deduce information from analysed data and summarise it	Explain principles of report writing, Deduce information from analysed data and summarise it and generate presentations using computer packages
5.1.4 Use computer applications for data backup, information searching and learning	Describe importance of backing up data Explain causes of data loss and describe importance of computer antiviruses	Define data backup, Describe importance of backing up data Explain causes of data loss, Classify different type computer viruses and describe importance of computer antiviruses	Define data backup, Describe importance of backing up data, Explain causes of data loss, Define a computer virus, Classify different type

			of computer antiviruses and Demonstrate techniques in searching information on the internet
5.1.5 Use computer packages in ordering, invoicing, dispensing, selling and inventory management	List common inventory management applications and Demonstrate procedures for electronic dispensing and carry out management functions using computer.	List common inventory management applications, Demonstrate procedures for electronic invoicing and electronic dispensing and carry out management functions using computer	List common inventory management applications, Demonstrate procedures for electronic ordering, invoicing, electronic dispensing and selling and carry out inventory management functions using computer
5.2.1 Describe components of the WHO health management information system	Define health management system and List key performance indicators of health management system	Define health management system, List components of the WHO health management system and key performance indicators of health management system	Define health management system, List components of the WHO health management system, Explain the importance of health management system and, list key performance indicators of health management system
5.2.2 Use MTUHA database in capturing and managing pharmaceutical data	Define MTUHA List commonly used MTUHA tools	Define MTUHA, List commonly used MTUHA tools, Capture and process data using MTUHA database software.	Define MTUHA, List commonly used MTUHA tools, Capture and process data using MTUHA database software and generate reports from MTUHA database
5.2.3 Perform simple data analysis using MTUHA database	Identify pharmaceutical services problems from analysed data	Establish trends of pharmaceutical services from MTUHA database and Identify pharmaceutical services problems from analysed data	Establish trends of pharmaceutical services from MTUHA database, Identify pharmaceutical services problems from analysed data and Prepare reports

5.3.1 Describe the components of Integrated logistics system	Define Integrated logistics system, List key features of the ILS system and Complete R and R forms	Define Integrated logistics system, Objectives of the ILS system, List key features of the ILS system, and Complete R and R forms	Define Integrated logistics system, Differentiate between pull and push systems, Objectives of the system, List key features ILS system and Complete R and R forms and Explain ELMS in the management of pharmaceutical information
5.3.2 Describe management of pharmaceutical information in vertical programmes	Mention vertical programme existing in the country	Define the term vertical programme and Mention vertical programme existing in the country	Define the term vertical programme, Mention vertical programme existing in the country and Explain importance of pharmaceutical information management in vertical programmes
5.3.3 Use networking programs in disseminating pharmaceutical information.	Explain the importance of networking in dissemination of pharmaceutical information	Explain the importance of networking in dissemination of pharmaceutical information and List networking programmes used in dissemination of pharmaceutical information	Explain the importance of networking in dissemination of pharmaceutical information, List networking programmes used in dissemination of pharmaceutical information and be able to Disseminate pharmaceutical information
6.1.1 Describe the concept of organic chemistry in pharmacy	List characteristics of organic compounds	Define organic chemistry and List characteristics of organic compounds	Define organic chemistry, List characteristics of organic compounds, and Explain the importance of organic chemistry in pharmacy
6.1.2 Describe classification of organic compounds	Classify, Draw and explain chemical structures of organic compounds.	Classify ,Draw and explain chemical structures and nomenclature of	Classify, Draw, explain chemical structures and their properties of different classes and

and their structures		organic compounds	nomenclature of organic compounds.
6.1.3 Describe chemical reactions involving organic compounds	Define term chemical reaction and list types of chemical reactions in organic compounds	Define term chemical reaction and List types of chemical reactions in organic compounds and	Define term chemical reaction, List types of chemical reactions in organic compounds, and Explain chemical reactions in organic compounds
6.2.1 Describe basic structure and functions of plant parts	Explain structure of plant cell and morphology and functions (roots, stem, leaves, flowers, fruits, seeds and barks) of a plant cell Explain plant	Explain structure of a plant cell, functions of plant cell organelles, plant morphology and functions (roots, stem, leaves, flowers, fruits, seeds and barks) of a plant	Explain structure of a plant cell, functions of plant cell organelles ergastic substances, plant tissue and tissue systems, morphology and functions (roots, stem, leaves, flowers, fruits, seeds and barks) of a plant
6.2.2 Describe natural sources of drugs	List sources of drugs and plants commonly used as source of drugs in Tanzania	List sources of drugs, Explain natural sources of drugs and plants commonly used as source of drugs in Tanzania	List sources of drugs, Explain natural sources of drugs, Explain the importance of plant as a major source of drugs and List available plants commonly used as source of drugs in Tanzania
6.2.3 Explain the importance and use of natural sources of drugs in pharmacy practice	Explain economic influences on cultivation of medicinal plants plants	Explain social influences on cultivation of medicinal plants Explain economic influences on cultivation of medicinal plants plants	Explain social influences on cultivation of medicinal plants Explain economic influences on cultivation of medicinal plants List common misuse of medicinal plants
6.2.4 Explain cultivation, distribution, collection and storage of medicinal plants	Classify medicinal plants, List methods for collection medicinal drugs, Explain storage of medicinal plants and	Classify medicinal plants Explain methods used in cultivation of medicinal plants, List factors influencing cultivation of medicinal	Classify medicinal plants, Explain methods used in cultivation of medicinal plants. List factors influencing cultivation of medicinal

		collection medicinal drugs, Explain storage of medicinal plants and, Explain adulteration of crude drugs	collection medicinal drugs, Explain storage of medicinal plants, List monographs of medicinal plants Explain adulteration and evaluation of crude drugs
6.2.5 Explain methods for processing and extraction of active medicinal principals from natural sources	Explain the importance of processing medicinal plants and, List methods of extraction of crude drugs	Explain the importance of processing medicinal plants, List methods of extraction of crude drugs, and Explain method of drying of crude drugs	Explain the importance of processing medicinal plants List methods of extraction of crude drugs, List solvents used in extraction, and Explain method of drying of crude drugs
6.2.6 Identify medicinal plants containing toxic substances.	List plants containing toxic substances	List plants containing toxic substances and toxic elements/principals in medicinal plants	Classify plants containing toxic substances, List plants containing toxic substances and toxic elements/principals in medicinal plants
6.2.7 Describe active medicinal principals from natural sources	List uses of active principals from medicinal plants (alkaloids, glycosides, volatile oils, fixed oils, fats etc.) and, List sources and uses of active principals from animals (alkaloids, glycosides, volatile oils, fixed oils, fats etc.).	List sources of active principals from medicinal plants (alkaloids, glycosides, volatile oils, fixed oils, fats etc.), List uses of active principals from medicinal plants (alkaloids, glycosides, volatile oils, fixed oils, fats etc.), and List sources and uses of active principals from animals (alkaloids, glycosides, volatile oils, fixed oils, fats etc.).	List sources of active principals from medicinal plants (alkaloids, glycosides, volatile oils, fixed oils, fats etc.), List uses of active principals from medicinal plants (alkaloids, glycosides, volatile oils, fixed oils, fats etc.), List sources and uses of active principals from animals (alkaloids, glycosides, volatile oils, fixed oils, fats etc.) and List sources and uses of active principals from minerals
6.3.1 Explain the concept of isomerism	Explain the importance of isomerism in pharmacy	Define isomer, isomerism, and explain the importance of isomerism in pharmacy	Define isomer, isomerism, explain the importance of isomerism in pharmacy, list and

			explain types of isomers.
6.3.2 Explain biotransformation methods of medicinal products	Explain metabolism of different organic compounds	Define biotransformation and explain metabolism of different organic compounds	Define biotransformation, explain metabolism of different organic compounds and the importance of biotransformation
6.3.3 Describe structure-activity relationship of drugs	Define structure-activity relationship and explain the importance of structure-activity relationship in pharmacy.	Define structure-activity relationship, explain the importance of structure-activity relationship in pharmacy and, relate organic structures of penicillins, quinolones, cephalosporin and sulphonamides, aspirin and paracetamol	Define structure-activity relationship, Classify drugs according to their chemical nature, explain the importance of structure-activity relationship in pharmacy and relate organic structures of penicillins, quinolones, cephalosporin and sulphonamides, aspirin and paracetamol.

12.0 DESCRIPTION OF MODULES

12.1 Module Title: MEDICINES AND MEDICAL SUPPLIES MANAGEMENT

Module Code: PST 05101

Number of Credits: 12

Sub-Enabling Outcomes

1.1.1 Describe the purpose of health supply chain management.
1.1.2 Describe quantification methods and forecasting of medicines and medical supplies.
1.1.3 Describe procurement process of medicines and medical supplies.
1.1.4 Explain major procurement agencies for medicines and medical supplies
1.1.5 Describe the components of Integrated Logistics system

Pre-requisite Module: PST 04212: MEDICAL STORES MANAGEMENT

Learning Context:

This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments

Learning Materials:

Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) MSH and WHO (2012) Managing Access to Medicines and Health Technology, 3rd Edition. Kumarian Press
b) World Health Organization (WHO), Regional Office for Africa Brazzaville 2004, Management of Drugs at Health Centre Level Training Manual.
c) United Republic of Tanzania Ministry of Health and Social Welfare, Strategy for Development and Implementation of an Integrated Logistics System for Essential Health

d) USAID | DELIVER PROJECT, Task Order 1. 2011. Tanzania: 2020 Supply C
Modeling—Forecasting Demand from 2020–2024. Arlington, Va: USAID | DELIV
PROJECT, Task Order 1.
e) Ndeki, S. Management of health services, CEDHA, Arusha

12.2 Module Title: LAW AND POLICIES IN PHARMACY PRACTICE
Module Code: PST 05102
Number of Credits: 7
Sub-Enabling Outcomes

1.2.1 Explain legislations governing procurement of medicines and medical supplies in
public health facilities.
1.2.2 Explain legislations governing procurement of controlled substances
1.3.1 Explain national medicines policy in relation to pharmaceutical services
1.3.2 Explain policies and guidelines governing procurement of medicines for HIV/AIDS
and Leprosy.
1.3.3 Explain policies and guidelines governing procurement of medicines and medic
supplies for vertical programmes.
4.3.1 Describe procedures for handling controlled medicines
4.3.2 Explain policies governing the handling of prescription only medicines
4.3.3 Explain legislation governing the handling of controlled medicines

Pre-requisite Module: PST 04208: LAWS AND ETHICS IN PHARAMCY PRACTICE

Learning Context:
This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments

Learning Materials:
Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual
Key References:

a) MSH and WHO (2012) Managing Access to Medicines and Health Technology, 1st Edition. Kumarian Press
b) Jessop, D and Morrison, D (1994) Storage and Supply of Materials, 6th Edition Prentice Hall
c) MoHSW (2003) Tanzania Food, Drugs and Cosmetics Act, Government Printers Dar es Salaam
d) MoHSW (2011), Pharmacy Act, Government Printers Dar es Salaam
e) United Republic of Tanzania (1971), the drugs and prevention of illicit traffic in drugs act Government Printers Dar es Salaam
f) United Republic of Tanzania (2011), Public Procurement Act, Dar es Salaam
g) MoHSW (2003), The National Health Policy, Government Printers Dar es Salaam
h) MoHSW (1991), The National Drug Policy, Government Printers Dar es Salaam

12.3 Module Title: PHARMACEUTICAL MICROBIOLOGY
Module Code: PST 05103
Number of Credits: 12
Sub-Enabling Outcomes

3.1.1 Describe fundamentals principles, concepts and importance of microbiology in pharmacy practice
3.1.2 Describe bacteriology, virology, parasitology and mycology of medical and pharmaceutical importance
3.1.3 Describe management of common bacterial, viral, fungal and

3.2.1 Explain principles of antisepsis, disinfection and sterilisation
3.2.2 Describe conditions requiring antisepsis and disinfection
3.2.3 Describe methods and agents used in sterilisation
3.4.1 Describe concept of immunology and immunization
3.4.2 Describe immunological preparations
3.4.3 Describe procedures of handling immunological products

Pre-requisite Module: None

Learning Context:

This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments

Learning Materials:

Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) Hugo and Russell(2011), Pharmaceutical Microbiology 8th Edition, Willey-Blackwel publications
b) Aulton M.E and Kevin M.G, Eds: (2013) Pharmaceutics the design and manufacture of medicines,4th Churchill edition Livingstone
c) Cooper and Gunns Eds (1987) Dispensing for Pharmaceutical Students, 12th Ed. CBS Publishers and Distributors; Delhi
d) Karen C. Carroll et al (2013); Jawetz, Melnick and Adelberg's Medical Microbiology 26th Ed. McGraw Hill Co. Inc.
e) Greenwood et al (2012); Medical Microbiology, 18th edition Churchill Livingstone

12.4 Module Title: PHARMACOLOGY AND THERAPEUTICS

Module Code: PST 05104

Number of Credits: 12

Sub-Enabling Outcomes

4.1.1 Describe pharmacokinetics of essential medicines
4.1.2 Describe pharmacodynamics of essential medicines
4.1.3 Describe side effects, contraindications and adverse reactions of essential medicines
4.1.4 Describe concept of toxicology

Pre-requisite Module: PST 04211: BASIC PHARMACOLOGY

Learning Context:

This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments

Learning Materials:

Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) Foster R.W (1996); Basic Pharmacology, 11th edition, CRC publishers
b) Tricia M. Berry et al (2009); Clinical Pharmacology made incredibly ease, 3rd edition, Lippincort Williams and Wilkins
c) Laurence D.R, Bennett P.N, Brown J. (2000); Clinical Pharmacology, 8th edition, science press
d) Goodman and Gilman's (2011), The Phamacological Basis of therapeutics, 11th Ed.McGraw Hill

f) Tripathy/KD, (2013), Essentials of Medical Pharmacology, 7th edition, Jaypee brothers medical Publishers delhi
g) Heinza et al (2000), Color atlas of Pharmacology, 2nd edition, Thieme Stuttgart
h) James M.R et al (2008), Textbook of Clinical Pharmacology and Therapeutics, 8th Edition, Hodder Arnold London
i) Rang, H. P et al (1995), Pharmacology, 3rd Edition, Churchill Livingstone

12.5 Module Title: RATIONAL USE OF MEDICINES

Module Code: PST 05105

Number of Credits: 4

Sub-Enabling Outcomes

4.2.1 Describe causes of irrational use of medicines and associated problems.
4.2.2 Explain essential medicines concept in promoting rational use of medicines.
4.2.3 Explain the role of drug marketing and promotions in supporting rational use of medicines.

Pre-requisite Module: None

Learning Context:

This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments

Learning Materials:

Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) MSH and WHO (2012) Managing Access to Medicines and Health Technology, 3rd Edition. Kumarian Press
b) Kathleen Holloway and Terry Green (2003), Drug and therapeutic committee A practical guide, W.H.O Geneva
c) Standard Treatment Guidelines and National Essential Medicines List (2007)
d) AMREF (2007) Distance Education Programme: Drug management and rational Use, Nairobi.

12.6 Module Title: PHARMACEUTICAL ORGANIC CHEMISTRY

Module Code: PST 05106

Number of Credits: 12

Sub-Enabling Outcomes

6.1.1 Describe the concept of organic chemistry in pharmacy
6.1.2 Describe classification of organic compounds and their structures
6.1.3 Describe chemical reactions involving organic compounds
6.3.1 Explain the concept of isomerism
6.3.2 Explain biotransformation methods of medicinal products
6.3.3 Describe structure-activity relationship of drugs

Pre-requisite Module: None

Learning Context:

Learning Materials:
Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) Ternay, A.L (1976) contemporary Organic Chemistry, W.B. Saunders Co. Philadelphia
b) Morrison R.T and Boyd R N (1997) Organic chemistry, 6th Edition, Prentice Hall of India, New Delhi
c) Graham Solomon et al (2014), Organic Chemistry, 11th Edition, John Willey and Sons
d) Rama Rao Nadendla (2005); Principles of Pharmaceutical Organic Chemistry, MacMillan India
e) Bruice Y (2014); Organic Chemistry, 7th edition Prentice Hall
f) Wilson L., Gillson M (); Medicinal Chemistry, Lippincott Williams, California
g) Bhassin S.K, Gupta R.(2013); Pharmaceutical organic chemistry, Kindle edition, Elsevier Health sciences

12.7 Module Title: QUALITY ASSURANCE OF PHARMACEUTICAL PRODUCTS

Module Code: PST 05207

Number of Credits: 12

Sub-Enabling Outcomes
2.1.1 Explain the principles of Good Manufacturing Practices.
2.1.2 Explain components of Good Manufacturing Practices.
2.1.3 Describe quality control and assurance in relation to preparation of pharmaceutical products
2.3.1 Explain standard operating procedures of equipment and machines in facility-based pharmaceutical preparation unit
2.3.2 Explain the operating principles of equipment and machines in facility-based pharmaceutical preparation unit.
2.3.3 Explain preventive maintenance procedures for equipment and machines in facility-based pharmaceutical preparation unit
3.3.3 Describe procedures for quality testing of pharmaceutical products.

Pre-requisite Module: None

Learning Context:
This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments

Learning Materials:
Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) British Pharmacopoeia (2014)
b) United States Pharmacopoeia (2014)
c) International Pharmacopoeia (2014)
d) Cooper and Gunns, Editors (1987) Dispensing for Pharmaceutical Students, 12th Ed. CBS Publishers and Distributors: Delhi

f) Lund, W. Editor (1994) The Pharmaceutical Codex, Principles and Practice of Pharmaceutics 12th Edition: The Pharmaceutical Press, London
g) Rawlins E.A, Editor: 1977 Bentley's Textbook of Pharmaceutics, 8th Ed. Baillie're Tindall, London
h) Kamm, G., Kohler B. Editors (1995); Manual for Decentralized Infusion Production, Infusion Unit Project Tanzania
i) Aulton M.E et al (2013), Pharmaceutics: The design and manufacture of Medicines, 4th edition : Churchill Livingstone, Edinburgh
j) Gennaro, R. A, et.al (eds) 1990 Remington's Pharmaceutical Sciences 18th edn: Mack Publishing Company, Easton, Pennsylvania 18042
k) Shayne C et al(2008), Pharmaceutical Manufacturing handbook Production and processes: John Wiley & Sons

12.8 Module Title: PHARMACEUTICS THEORY AND COMPOUNDING

Module Code: PST 05208

Number of Credits: 20

Sub-Enabling Outcomes

2.2.1 Describe sterile pharmaceutical preparations
2.2.2 Describe requirements for preparation of sterile pharmaceutical products
2.2.3 Use formula in the preparation of pharmaceutical products
2.2.4 Describe formulation of semi-solid pharmaceutical preparations
2.2.5 Perform calculations on isotonicity, electrolytes, constitutions, intravenous admixtures and rate of flow.
3.3.1 Explain concepts of preserving pharmaceutical products
3.3.2 Describe agents used in preservation of pharmaceutical products

Pre-requisite Module: PST 04209: COMPOUNDING OF PHARMACEUTICAL LIQUID PROPARATION

Learning Context:

This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments.

Learning Materials:

Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) Cooper and Gunns, Editors (1987) Dispensing for Pharmaceutical Students, 12th Ed. CBS Publishers and Distributors; Delhi
b) Cooper and Gunns, Editors (2005) Tutorial Pharmacy, 12th Ed. CBS Publishers and Distributors; Delhi
c) Liebsch, B et al (1988): Tanzania Pharmaceutical Handbook, Dar es Salaam University Press.
d) Lund, W. Editor (1994) The Pharmaceutical Codex, Principles and Practice of Pharmaceutics 12th Edition: The Pharmaceutical Press, London
e) Rawlins E.A, Editor: 1977 Bentley's Textbook of Pharmaceutics, 8th Ed. Baillie're Tindall. London Kamm, G. and Kohler, B. Editors: 1995 Manual for Decentralized Infusion Production, Infusion Unit Project Tanzania
f) Aulton M.E ed (2013), Pharmaceutics: The design and manufacture of Medicines,

h) Shayne C et al(2008), Pharmaceutical Manufacturing handbook Production and processes: John Wiley & Sons
i) Howard C Ansel (2010), Pharmaceutical calculations, 13th Edition: Lippincott Williams & Wilkins London.
j) Stocklosa MJ, pharmaceutical calculations, Williams & Wilkins London
k) Senya, S, et al (2011): Tanzania Pharmaceutical Handbook, School of Pharmaceutical Sciences- MUHAS.
l) Liebsch, B et al (1988): Tanzania Pharmaceutical Handbook, Dar es Salaam University Press.
m) Marriot et al (2010), Pharmaceutical Compounding and Dispensing, 2nd edition, Pharmaceutical Press
n) Loyd V. Allen (2005); The art and science of pharmaceutical compounding, 2nd edition, APhA Publications.
o) B. Peter, et al (2012), Dermatological Preparations for the Tropics, 2nd edition, Beta Science Shop, University of Groningen, The Netherlands\
p) Lund, W. Editor (1994): The Pharmaceutical Codex, 12th Edition. Pharmaceutical Press, London.
q) Martindale the complete drug reference (2014), Pharmaceutical Press
r) British Pharmaceutical Handbook (2015), Pharmaceutical Press
s) United State Pharmacopoeia NF (2014), United States Pharmacopeial Convention
t) International Pharmacopoeia
u) European Pharmacopoeia

12.9 Module Title: HEALTH INFORMATION MANAGEMENT

Module Code: PST 05209

Number of Credits: 12

Sub-Enabling Outcomes

5.1.1 Organize health related data using computer packages
5.1.2 Analyse health related data using computer packages
5.1.3 Report and present health related information using computer packages
5.1.4 Use computer applications for data backup, information searching and learning
5.1.5 Use computer packages in ordering, invoicing, dispensing, selling and inventory management
5.2.1 Describe components of the WHO health management information system
5.2.2 Use MTUHA database in capturing and managing pharmaceutical data
5.2.3 Perform simple data analysis using MTUHA database
5.3.2 Describe management of pharmaceutical information in vertical programs.
5.3.3 Use networking programs in disseminating pharmaceutical information.

Pre-requisite Module: PST 04107: BASIC COMPUTER APPLICATIONS

Learning Context:

This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments

Learning Materials:

Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) MSH and WHO (2012) Managing Access to Medicines and Health Technology, 3rd

c) United Republic of Tanzania Ministry of Health and Social Welfare, Strategy for Development and Implementation of an Integrated Logistics System for Essential Health Commodities: Government printers, Dar es Salaam
d) USAID | DELIVER PROJECT, Task Order 1. 2011. Tanzania: 2020 Supply Chain Modeling—Forecasting Demand from 2020–2024. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.
e) International Council on Archives (1999), Managing Public sector records, Understanding computers an over view for records and archives: International Records Management Trust London
f) Microsoft, introduction to Microsoft office 10.

12.10 Module Title: BASIC PHARMACOGNOSY
Module Code: PST 05210
Number of Credits: 12
Sub-Enabling Outcomes

6.2.1 Describe basic structure and functions of plant parts
6.2.2 Describe natural sources of medicines
6.2.3 Explain the importance and use of natural sources of medicines in pharmacy practice
6.2.4 Explain cultivation, distribution, collection and storage of medicinal plants
6.2.5 Explain methods for processing and extraction of active medicinal principals from natural sources
6.2.6 Identify medicinal plants containing toxic substances.
6.2.7 Describe active medicinal principals from natural sources

Pre-requisite Module: None

Learning Context:
This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments

Learning Materials:
Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) Trease and Evans (2009); Pharmacognosy, 16th Edition: Saunders, London
b) Joanne Barnes et al (2002), Herbal medicines 3rd Edition: Pharmaceutical Press
c) Wallis T.E, Textbook of Pharmacognosy, CBS publishers and distributors, Oxford
d) Robberss J.E, Speedie M.K, Pharmacognosy and Pharmacobiotechnology, warvelly company Baltimoere.
e) Henrich M. (2012); Fundamentals of pharmacognosy and phytotherapy, Churchill Livingstone

h) Shayne C et al(2008), Pharmaceutical Manufacturing handbook Production and processes: John Wiley & Sons
i) Howard C Ansel (2010), Pharmaceutical calculations, 13th Edition: Lippincott Williams & Wilkins London.
j) Stocklosa MJ, pharmaceutical calculations, Williams & Wilkins London
k) Senya, S, et al (2011): Tanzania Pharmaceutical Handbook, School of Pharmaceutical Sciences- MUHAS.
l) Liebsch, B et al (1988): Tanzania Pharmaceutical Handbook, Dar es Salaam University Press.
m) Marriot et al (2010), Pharmaceutical Compounding and Dispensing, 2nd edition, Pharmaceutical Press
n) Loyd V. Allen (2005); The art and science of pharmaceutical compounding, 2nd edition, APhA Publications.
o) B. Peter, et al (2012), Dermatological Preparations for the Tropics, 2nd edition, Beta Science Shop, University of Groningen, The Netherlands\
p) Lund, W. Editor (1994): The Pharmaceutical Codex, 12th Edition. Pharmaceutical Press, London.
q) Martindale the complete drug reference (2014), Pharmaceutical Press
r) British Pharmaceutical Handbook (2015), Pharmaceutical Press
s) United State Pharmacopoeia NF (2014), United States Pharmacopeial Convention
t) International Pharmacopoeia
u) European Pharmacopoeia

12.9 Module Title: HEALTH INFORMATION MANAGEMENT

Module Code: PST 05209

Number of Credits: 12

Sub-Enabling Outcomes

5.1.1 Organize health related data using computer packages
5.1.2 Analyse health related data using computer packages
5.1.3 Report and present health related information using computer packages
5.1.4 Use computer applications for data backup, information searching and learning
5.1.5 Use computer packages in ordering, invoicing, dispensing, selling and inventory management
5.2.1 Describe components of the WHO health management information system
5.2.2 Use MTUHA database in capturing and managing pharmaceutical data
5.2.3 Perform simple data analysis using MTUHA database
5.3.2 Describe management of pharmaceutical information in vertical programs.
5.3.3 Use networking programs in disseminating pharmaceutical information.

Pre-requisite Module: PST 04107: BASIC COMPUTER APPLICATIONS

Learning Context:

This module will be conducted through lectures, lecture discussion, group discussion, role plays, simulation, assignments and practical assignments

Learning Materials:

Books, Journals, Writing Board, Flip Charts, OHP, Multimedia Projector, Audio visual

Key References:

a) MSH and WHO (2012) Managing Access to Medicines and Health Technology, 3rd