

VU ZOOLOGISTS

BT605 Final term Past Papers 2017 solved

1. What are the precautions made in BSL2 as compared to BSL1. 2

1. The major difference in BSL1 and BSL 2 workers which are working in BSL 2 in lab must have training for handling infectious material.
2. Special practices and equipment also required.
3. We restrict movement of people in the lab having BSL-2.
4. Then special bio containment required for this lab especially biosafety cabinet.

2.Physical Security elements? 3

Topic no 129 Physical security Elements

It not only deals with protection of people but Also deals with hardware network programmes as well as protection of data .Now physical elements are of **three types** these are **abstacals notification and recovery stage.Obstakles** placed in the way of attackers.**Survillence and notification systems.Methods to recover quikly from disasters.**

3.Equipment used in BSL3, write 5 points 5

Equipment:now here special equipments are required for example apart from personal equipment glass eye feel any shoe cover we also require **special vaccume line** msut be protected with HEPA filters.WE need **Ducted air ventilation syatem.In biosafty cabnet HEPA filters used same in ducted air ventilation system.**biosafty cabnent actually a chamber that has three filters 1 hepa filater intake air and 2 Hepa filter for exit air in order to dispersed away the contaminated air from occupied area.BSL 3 must be fully documented facility design that include decontamination of larger pieces of equipments any sort of operation any parameter regarding procedure must be documented prior to performing the procedure.

How risk can be reduced through risk management? 5

Write note on special practice in BSL2. 10

Discuss malicious risk groups and Its Types? 10

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4, Biosecurity?3

US Legislation: Biosecurity Bill 2014 and supported legislation were passed by government. Now they become biosecurity act 2015. We apply this act in every field related to agriculture, related to pharmaceutical. Agriculture biosecurity department has made cooperation collaboration with 400 organisations. Biosecurity act of US consist of 630 pages.

Future aspect of this biosecurity act 2015:

Biosecurity act support biosecurity system in any age. Regardless of the advances in technology in scientific field like biotechnology. **Scientific advances and advises** help to make right decision.

Objectives: Was to create a modern and responsive legislation framework. Improves the underpinning process so create **the robust biosecurity system** that benefits everyone. Now this robust system prevent entry and establishment of invasive and exotic pests which are lethal because these species not only harmful for the environment but also related to the safety of humans also depends upon economy.

5. BSL3?

Topic 85

BSL-3: It is applicable to diagnostic lab clinical research areas even production and teaching facility's, BSL3 include those agents that cause fetal disease and potentially hazardous disease in the human being because they appear in the environment in the form of aerosols and human being can inhale them as result enter in to the body through inhalation route. microbiological practices should be performed in the biosafety cabinet.

Equipment: now here special equipment's are required for example apart from personal equipment glasses eye shield and shoe cover we also require **special vacuum line** must be protected with HEPA filters. We need **Ducted air ventilation system. In biosafety cabinet HEPA filters used same in ducted air ventilation system.** biosafety cabinet actually a chamber that has three filters 1 hepa filter intake air and 2 Hepa filter for exit air in order to dispersed away the contaminated air from occupied area. BSL 3 must be fully documented facility design that

include decontamination of larger pieces of equipments any sort of operation any parameter regarding procedure must be documented prior to performing the procedure.

Topic no 86

6.BSL-4:

This is the highest containment level it include those agents that are dangerous exotic because they have ability to appear in the environment or contaminate environment in the form of aerosol .Aerosols are easily inhale by the workers who are working in the lab and can be easily infected by the infectious agents.These are dangerous because cause lethal disease inhumans no special vaccines are available no special treatment no specil precautionary measures can be taken.Here we have to take special precautionary measures for workers who are working in lab in order to prevent the formation o aerosol as much as possible now there is unknown risk for transmission.We **divided BSL-4 in two types**

1)A cabinet laboratory: Manipulation of agent in BSC.be can manipulate culture infectious material in a biosafety cabinet.Now biosafety cabinet that is satisfied and used according to the manufacturer detal they have double doors material that contain infectious agent fisrt passes through autoclave for sterilization then disposed of biosafety cabinet.Now in autoclave sterilization occurs 21 degreecentgrade for 15 to 20 mintues pressur 15 poundes.Biosaftey cabinet must be designed if infectous material not sterllized in autoclave it must be removed carefully from biosaftey cabnet.Never put sharp things in BSC.It is better to avide such material.Now apart from HEPA filaters which are used in filtartion that intake airand exote air gas and vapor decontaminaton unit in BSC.Now the worker who are using biosaftey cabnet must wear glass eye shields then shoes cover once they enter into the lab they have followed all those personal equipments which are required for the lab bsl4.It is responsibility of lab manager to look at repair and maintainance of

BSC. 2ND TYPE:A suit laboratory: Where personnel must wear positive pressure air protective suit.BSC used for all microbiological procedures and decontamination od gloves and apparatuses during lab operations.

7.Risk management?

Topic No 151 Risk assessment or Risk management

Article 15 Annex 3 of Cartagena protocol set forth in national biosafety guidelines. **National Biosafety committee will monitor all activities** that are performed by researchers whether they are according to biosafety guidelines or not. Also check the license. **Auditing of risk assessment** in Pakistan we followed the risk assessment scheme in which we compare the variables second method is scoring system in which we check out that whether activities are at which risk level according to data we access the risk but management is very important performs by three ways the first one is **auditing second one evaluation of risk management and third one is field trials which is carried out case by case studies in a scientifically sound manner.**

8. Measures required for TB lab?

Biosafety measures for TB lab: Microbacterium Tuberculosis is caused by Microbacterium Tuberculosis and is contagious means it can be transmitted from one individual to another simply by coughing in action.

In lab we have to follow special biosafety measures for handling specimen like sputum blood or cultures.

- Can affect the code of practice,
- equipment lab design
- health facilities,
- health surveillance training
- waste handling.

9. Biosecurity plan 3

Design Biosecurity plan

Biosecurity plan:

Written plan prevents introduction and spread of disease. It is written documentation or written plan that prevents introduction of pathogens into nation that affect any population or sub population even it can effect organizations. It not only deal production of pathogen in to the environment or organizations also prevents spread of diseases. We have to look

daily operations procedures also deals with disinfection method important part of biosecurity plan. Biosecurity plan starts with disinfection.

Responsibilities: Principle investigator of laboratory they're involved in making biosecurity plan in the proper implementation of that plan. Investigator also involved in the trainings of workers according to methodology biosafety or biosecurity. Then lab workers also responsible for designing biosecurity plan. They have to get special training techniques then they apply standard procedures in the laboratory and implement them routinely in case of any spillage disinfectant should be done properly and principle investigator should be involved. Principle investigator cannot work alone he or work in collaboration with responsible officials. Campus security staff for 24 hours related to the biosecurity of lab organization or workers. If we talk about management services electricity gas water services. Such people must know the nature of lab work as well.

Responsibilities of responsible officer RO: responsible officer work with in collaboration with principle investigator for designing biosecurity. He must be contacted if biological agents lost or theft in laboratory because this is very serious issue pathogens used for terrorism. Responsible officer must contact with agencies if threat. training also compulsory for Responsible officer, principle investigator and RO conduct workshop and trainings.

Other aspects: Risk assessment not only confined in a laboratory also applicable field of agriculture when handling animals or food industry this is how we identify lethal pathogens. Different methodologies depends upon type of work which we are performing. Personal protection starts from building structures facilities policies equipments and other things like sanitations part of physical protection. In personal protection we have to wear gloves face mask face shield even respirators if we are dealing the work group. **Pathogen accountability** : If a disease can spread epidemic or pandemic it is medical need to design vaccine we have to do basic research on vaccine goes toward manufacturing stage there is risk management assessment. **Emergency response**: in case of any spillage we must contact with RO.

10. Biohazard is classified into four elements name them write their categories, name their substance

5

Classification:

- Category A, UN 2814-infectious substances affecting humans
- Category A, UN 2900-infectious substances affecting animals
- Category B, UN 3373- biological substances transported.
- regulated medical waste, UN 3291- waste or reusable material
- derived from medical treatment/research

11.Bioweapons? And their threats and how they migrate 10

Topic NO 160 Effort To Mitigate Biological Threat

Whenever we use word biological threat term comes in our mind bioweapon or bioterrorism

Bio mean life and weapon means infectious agents that are used weapon against human being known as bioweapons.

Bioweapon: Any infectious agent that bacteria viruses used intentionally to cause harm to human being known as bioweapon other term that used for bioweapons is bioterrorism these both are synonyms. Now at national and international plane or programmes developed against the biowar defence planning of effective biowar defence very difficult task whether national or international level. It affects the nations and bring fear among public also effect the scientific community.

Defence Against Bioweapons: **International cooperation** we have to cooperate with international agencies to control bioweapons. Also **transfer of technology** that help to create bioweapons, we have to **Support national actions**. These three things are important that help to create defence against bioweapon.

BTWC: Now for bioterrorism and bioweapons not a new idea since union also used bioweapons against their enemies biological toxin weapon convention was developed 1972 when there is spread of bioweapon. Now BTWC is worldwide accepted which was established 1972 is institutionally weak an implementation is ineffective without investigation BTWC institutionally weak.

Biological threats: Terrorist non state actors, misuse of technology. Bacteria virus can be taken from lab. National and international extremists act as biological threat. Sometimes international agencies are involved because of unemployment poverty they locally hire agents so frustration among people increases due to poverty and unemployment in developing countries.

Efforts to mitigate threats: ACCORDING TO BTWC ACT must be designation of focal point must be central implementation authority dealing with biosafety guidelines. Code of conduct for biologists researchers awareness regarding biosafety biosecurity bioweapons among public.

Pakistan efforts to mitigate biological threats Pakistan approach: Front line of war on terror They not suffer financial loss also suffer from human loss every year. Bioweapons are not the part of security matrix. In dealing with bioweapons Pakistan has made tremendous progress

In 2005 new legislations have been introduced in Pakistan regarding biosafety. Also improve their administrative measures risk assessment risk management NCGLs. National core group of life sciences was established in 2007. Biosafety biosecurity must present in syllabus. Syllabus once design by committee finally review by HEC.

BPSA 2008: Pakistan biological safety association. Their purpose is to train the trainer who are seeking for biological certification they cover the module which are risk assessment management and also designing lab.

Efforts: National institute of health-WHO. they work with collaboration world health organization to control the diseases. Export control act 2004 also functional in Pakistan this is for reexport overexport and transshipment of goods technologies and equipments. Special actions taken against them if we not follow rules 14 years imprisonment or 5 million rs fine.

12. How immunization can be provided to fight against pathogens. 5

Topic no 107 Immunization of staff

This is for personal safety and safety of worker. Immunization is an example of active immunity which is very necessary if you want to do work in the laboratories. If you appoint any person in lab then you have to check the vaccination card whether they fulfill all the vaccinations included EPI programme or not also **discuss with workers. Vaccines are** available for hepatitis B that

should given to the workers very important virus in pakistan Mutation not cause by immunological genetic factor but also cause by environmental factors microorganism is important part of environmental factors they bring about the mutation and cervical cancer is one of major cancer 80% female suffer from cervical cancer for that HPV vaccination available vaccination available for human papilloma virus it can cause cervical cancer in female we can get vaccination from age of 19 year and onwards .If exposure in lab then **therapeutic drugs** should be available in lab in order to treat workers.

13.Name the things for protection in first aid kit

Contains??:

- first aid box
- protective clothing
- safety equipment
- eye irrigation

First aid box:

- made up of material keep the content dust and damp free
- white cross with green box
- prominent position
- easily recognizable

Box contains??:

- first aid manual
- bandages
- sterile dressings
- safety pins

14.Name lab safety things 2

Lab safety

- safety glasses,

- closed-toed shoes
- no food/drink
- long hair must be tied
- lab coat
- open flames-unattended
- flammable liquids
- skin contact-rinse off
- proper waste disposal
- ,liquid waste-labeled containers
- equipment must be cleaned and placed back,
- inform-chemical spill/thermometer breakage
- be careful-handling hot glassware and apparatus
- avoid taking excess amount of chemicals
- cell phones/ head phones are not allowed
- lab door must be kept close
- chairs not permitted -lab work is in session
- lab must be fully equipped with fire extinguisher
- fire blanket/safety shower
- eye wash/ first aid kit
- fume hoods/ sodium hydrogen carbonate

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15.Cybernetics (2)

16.Elements of act?

17.Functions of technical adversary committee? 5

Function of technical Advisory Committee:1)examine applications researchrs about the project and recommend it to national biosaftey committee for their approvel they review contol safety measures as well.Review research methodology as well.They also monitor commercial release of GM o and products into the environment.Look at safety regarding

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humans and environment as well. Provide information regarding national biosafety committee about approved projects upto which level project have been completed funds utilized. Also supervise implementations of terms and conditions

18. First aid equipment's? 5

Protective
equipment:

- mouth piece for mouth-to-mouth resuscitation
- gloves-protections
- clean up kit for blood spills

19. Discuss transport security element.

Topic No 135 Transport security Elements

It consists of two elements one is **internal transport** other is **external transport**.

Internal transport: It is transport of movement of biological materials within the country. Movement of biological material from to restricted area but remain within the facility. If we are moving biological material within the institution we will refer reliable lab works but if we moving biological material from one city to another we will divide the area into three **groups**
one shipping area: It is the area where disposing biological materials for transport here use your id card special documents regarding composition of **pathogens** **2nd receiving area:** Here the receiving name should be mentioned he or she will bring id card and **3rd one is disposal area:** That is incinerator used for pathogens and toxins.

External transport:

It is the movement of biological material to another country these are two elements of transport biosecurity. Movement of biological material from one facility to another. So this involves commercial carriers. More than 30 commercial carriers available most commonly used is AIRTA and WHO here able to move frozen samples material. External transport is expensive as compared to internal. **In external transport we divide material into two groups first group is**

categories A second one is category B infectious material or pathogens in the form of culture isolated DNA isolate RNA it is recruited in category B such material **required triple packaging system** triple packaging names indicates primary secondary or tertiary. **Primary layer** consist of specimen that protects the specimen any sort of leakage **second layer** protect the primary layer and water proof and **third layer** protect the secondary layer.

20. Write some activities of bio safety officer.

Activities:

- biosafety consultation

- biosecurity

consultation

- technical compliance

consultation

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Eutrophication

BT605-Biosafety & Bioethics (15-08-2017)

Total Q 45 36 Mcqs 5 short Q (2 and 3 marks)

21. Functions of physical security?

First component of biosecurity it gives not only protection to people working in the lab .It also protect hardware or the programmes with which organization the lab work dealing with then data and network.

Physical events and physical circumstances that can occurs it can occurs in the form of terrorism then natural disasters in the form of fires or explosive chemical physical security not only deal with protection of people lab workers.In order to deal with the physical events that is of terrorism and disasters be used the component of biosecurity that is physical security.

22. What are surveillance elements?

Surveillance/notifi

cation system:

- heat detector

- smoke detector

- lighting

- alarms

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- cameras

Surveillance and notification system:

- These are the **heat detectors** Heat detectors can give us alarms there is high temperatures for samples as well as equipment then
 - **Smoke detectors** detect the smoke it protect the building from fire.
 - **Light** is proper in lab especially bio work then emergency alarms should be there
 - **Cameras** to control the access of authorized people to the lab.
5. Duties of technical committee?
 6. **Committee** 3rd Technical biosafety committee not only deals with biosafety rules also deals with biosecurity rules depending upon field which Gmo is used.

23. What are malicious risk groups, explain it? (10)

Topic no 125 Characterize Risk

Here we characterize risk according to the **Malicious Risk Group** : Non pathogenic 2nd one is low malicious use risk which is commonly known as LUMER). 3rd one is moderate malicious use risk MMUR.

4th High malicious use risk HUMER or extreme malicious use risk EMUR. These are five malicious risk group. Noe discussed them one by one.

1) Non pathogenic: These are inherent hazardous agents that cause no or insignificance consequences. These are non pathogenic not harmful for human beings. **LMUR IS SO CALLED low** when inherent hazardous causes low consequences when use when use maliciously. Most of biological agents included in these first two one is non pathogenic and **2nd low malicious use risk.**

Examples: **Mycobacterium leporae** is acid fast bacilli they give acid fast reactions when stained with carbol fuchsin size of this bacteria are parallel and arrangements are usually palisade this mycobacterium tuberculosis cause disease laprase organism grow very slowly about 30 days. This organism is not highly virulent. We treat it with multi drug treatment.

MMUR: These pathogens microorganism and hazardous material can cannot deploy as biological weapons. Low moderate consequences and low and moderate economic impact any nation. Many current agent evaluated as MMUR.

Example: c immunitis Fungus, it cause disease desert fever. No symptoms appears. Cure without treatment. bio safety level 3 MMUR. **HMUR:** national and international consequences it means that these are the inherent hazardous agents. High economic impact. High casualties. **Example** bacillus anthracis that cause disease known as anthrax this bacteria gram positive rod spore former. In 2004 United States of America spores from one person to another in the form of mailed letter, mailed letters contain spores of anthrax.

EMUR-HMUR: it also cause high risk maliciously not found in the nature high security measures required. It should radiated from the nature. If you have prepared genetically engineered agents. **Example:** small pox. caused by virus variola major virus so called in the past they have use small pox as bioweapons worldwide decided small pox eradicated from world by vaccine. It is contagious transferred from one person to another must be eradicated by vaccine now it has been done

24. How risk can be reduced through risk management? 5

Topic 126 risk reduction

Strategies: to reduce risk strategies should be adopted. Established large policies and implement them.

Design programmes and small projects is dealing with risky agents to transparent with sponsors. Small policies have been design for us subpopulation management principle applied to small policies.

Risk Management: This is structured approach that occurs in steps to identify assess and control the risk. After identification we have to process in place minimize and control. We have to control adverse risk consequences materialize.

Steps: We have to identify our needs our requirements also we have to look at cost. Defer irreversible decision we need some more time develop alternative ways to achieve goals. need more time to achieve objectives. **Pilot studies:** purpose of these small studies is to more and more information about risk. We have to design such a strategies in risk assessment

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methodology that are flexible. Design flexibility modify future needs. **Precautionary actions** for biosafety system. Transferring

Risk to the private sector in the form of **insurance we transfer risk to** the insurance company. **Less use of leading edge technology we have to look at** the site investigation. Staggering the **project review at different** steps. Then it is **better to stop the project** when it is too risky for human being for animals plants as well as environment.

25. Genetic modification

29: Ethics and genetic modification

Genetic modification:

- any alteration of genetic material
- capable of producing new substances
- performing new functions

26. Test tube baby? (5)