**IMAYAM ARTS AND SCIENCE COLLEGE, KANNANUR, THURAIYUR**

**DEPARTMENT OF MICROBIOLOGY**

**QUESTION BANK**

**Title of the paper: Introductory Virology**

**Subject Code:16SCCMB4**

**2MARKS**

**UNIT I – HISTORY & CLASSIFICATION**

**VIRUS:**

Virus are simple, very simple small intracellular entities consisting of one or more molecules of either DNA or RNA enclosed in a protein coat. They can reproduce only inside the living cells called as obligatory intra cellular parasite.

**VIROLOGY:**

The study of virus and its structural characters is called as virology. The virus was first discovered by Dimitry Iwanowskii in 1892 and he got nobel prize in 1899.

**STRUCTURE OF VIRUS:**

Virus are acellular very small infectious agent that can be seen in electron microscope. They are 100 times smaller than bacteria. They contain nucleic acid that is either DNA or RNA. The nucleic acid is enclosed by a special protein coat called as capsid.

**VIRION:**

A complete virus particles are called as virion consist of one or more molecules with DNA or RNA enclosed by a protein coat containing carbohydrate and lipids.

**EDWARD JENNER:**

He published 23 vaccination and discovered the cow pox virus. He injected the pus taken from the infected victims and he found they got immunised with cow pox.

**SIZE OF THE VIRUS:**

The size of the virion ranges from 10-300nm diameter. The smallest virus is Parvovirus in 15nm and the largest virus is 300nm.

**SHAPE OF THE VIRUS:**

The shape of the virus may be rod, tadpole, bullet, spherical, brick and pleomorphic shape.

**VIRAL NUCLEIC ACID:**

The viral nucleic acid are of four types in virus . They are double stranded DNA, Single stranded DNA, Double stranded RNA and Single stranded RNA. All the four types of nucleic acid were found in both plant and animal virus.

**VIRAL ENZYMES:**

The enzymes are normally associate with the nucleic acid. There are three types of viral enzymes such as DNA Polymerase, RNA polymerase and RNA dependent DNA polymerase.

**VIRAL ENVELOPE:**

Viral envelope is made up of lipoprotein and glycoprotein. The viral envelopes are susceptible to lipid like chloroform, ether, basalt and iodine.Envelope provide perfect shape to the virus otherwise it acquire pleomorphic shape.

**VIRAL CAPSID:**

The capsid is the shield around the nucleic acid. It protects the viral genetic material. The capsid is composed of number of protein subunits called as capsomeres.

**PROTEOMERS:**

Capsomeres are constructed from many protein subunit called as proteomers. Five or six proteomers are combined together to form a structure called as proteomers.

**ICOSAHEDRAL SYMMETRY:**

It is a regular polyhedral with 20 equilateral triangular facets and 12 intersecting points or corners. Capsid appear in spherical shape. The capsomeres here are of two types such as pentagonal capsomeres and hexagonal capsomeres.

**HELICAL SYMMETRY:**

Monomers and nucleic acid are arranged in a helix around a spiral tube. The capsomeres are going outward and seen as rod shaped and bullet shaped virus. The number of capsomeres per helical turn will be depend upon the virus.

**COMPLEX SYMMETRY:**

It is the combination of icosahedral or helical symmetry. It has both head and tail and are said to be binal symmetry. They posess a combination of icosahedral head and helical tail.

**VIRAL CARBOHYDRATES:**

The viral envelope has been made up of glucose, galactose, fructose, mannose, glucosamine and galactosamine. It has been made of carbon , hydrogen and oxygen.

**VIRAL PROTEINS:**

Envelope made of glycoproteins and matrix cell wall protein. Glycoprotein is considered and is essential for infectivity. The matrix proteins was considered as non-glycosylated protein.

**PHAGINAE:**

It include all viruses that infect bacteria . These virus usually contain DNA genetic material.

**PHYTOPHAGINAE:**

It include all viruses that infect plants. These virus usually contain RNA.

**ZOOPHAGINAE:**

It included all the virus which may infect animals include man. The virus may contain DNA or RNA as the genetic material. They are otherwise called as animal viruses.

**LHT:**

This is a system of virus classification. This was proposed by Lwoff, RW.Horne and P.Tournier in 1962. It contain the phylum and subphylum.

**ICTV:**

The International Committee of Taxonomy of Virus has developed the current system of virus classification in 1991. ICTV has been revised every three years and published in the form of book.

**UNIT II-CULTIVATION OF VIRUS**

**CULTIVATION OF VIRUS**

Cultivation of virus is difficult process, because it cannot be cultivated on laboratory media. Since they can multiply only within living cells. Generally cell culture or tissue culture techniques are lysed for cultivation of viruses.

**BACTERIAL CULTIVATION:**

Virus can be cultivated in bacteria. Eg:Coliphage cultivation required a culture of E.coli Similarly, Actinophage is grown on Streptomyces

**PRIMARY CELL CULTURE:**

It is proposed directly animals and can be subcultivated only once (or) twice. Eg:Monkey kidney cell, Human amino cell culture

**SEMI-CONTINUOUS CELLS:**

It is derived from human foetal tissue and can be subcultured for 20-50 times**.** Eg: human embryonic kidney and skin fibroblast

**CONTINUOUS CELLS**

The cells derived from the tumours of human is called as continuous cells.. Eg:Hela cells-Human Carcinoma of cerevisiae cells

**TRYPANIZATION**

According to the virus cultivation , the tissue is taken and it is converted into small pieces by teasing. The species are washed with saline water. Then washed tissue fragments are placed in a sterile, clean flask containing trypsin.. At 4ᵒC, about 18 hours, trypsin converted small pieces of tissue into cell constituents by breaking down the segmenting materials that join the cell. This is known as Trypanization

**MONOLAYER**

The cell multiplies and form a thin layer. It produces a uniform growth. Such layers are called Monolayer.

**SUSPENSION CULTURE**

The cell remains suspended in a media is called as ‘SUSPENSION CULTURE’

**PRIMARY CULTURE.**

A culture directly derived from a tissue is called as PRIMARY CULTURE.

**DIPLOID CELL STRAIN**

Subsequent culture developed from a primary culture is called as ‘DIPLOID CELL STRAIN’

**PLAQUES**

After that the monolayer is inoculated with the type of virus which infects the host cell detected by forms with patches around the cell. These are called as Plaques

**CYTOPATHETIC EFFECT**

Virus cause morphological changes in the cell culture that is degeneration or cell death which can be seen by microscope. This effect is called as ‘CYTOPATHETIC EFFECT’

**MOI**

MOI-Multiplicity of Infection

Number of the viral particle required to cause the infection in a particular quantity of cell is called multiplicity of infection

MOI=Number of infectious units(IU)/Number of cells

**LOCAL LESION ASSAY:**

Infected patch on the tissue or body is called local lesion. It may be vesicle, boils, pustules or tubercules.

**PLAQUE ASSAY:**

Plaque is a clear bacteria free area caused by the lysis of bacterial cell. Bacteriophages, plant & animal viruses form plaques on the infected sites.

The plaque indicates an infectious virus.

The number of plaques is counted as Plaque forming units (PFU)

**POCK ASSAY**

Small depressions on the surface of sites of infection are called as pocks. They formed after pox pustules.

Eg:Vaccinia Virus

**FLUORESCENT FOCUS ASSAY**

It is the modification of plaque assay. The cells were examined under UV microscope. Infected cells were fluorest against dark background.

Virus can be expressed as florescent focus forming units/ml (FFU)

**TRANSFORMATION ASSAY**

It is used to determine the effect of virus that do not form plaque on cells.

The value of infectivity was expressed in terms of focus forming units/ml (FFU)

**END PONT DILUTION ASSAY**

The maximum dilution of a virus that cannot produce an infection (or) disease is called as end point dilution.

It is used for determining the virus of animals.

**DILUTION END POINT ASSAY**

The dilution at which no infection was demonstrated is known as dilution end point (DEP)

**ID50- INFECTIOUS DOSE 50**

The amount of virus required to cause infection in 50%of the host

**LD50-LETHAL DOSE 50**

The amount of virus required to kill 50% cells of the host

**CLARIFICATION:**

The removal of impurities from a homogenate is called as clarification.

**UNIT-III BACTERIOPHAGE**

**BACTERIOPHAGE**

The virus infect the bacteria and live within the bacterial cell is called as bacteriophage (or) bacterial virus. They are considered to be bacteria eaters.they are simply called as phages. It was discovered by Fedrick Twort & De’Herelle in 1917.

**CAPSID:**

The bacteriophage composed of nucleic acid surrounded by a protein coat called as capsid. The capsid is surrounded by capsomeres.

**M13 PHAGE:**

It is a filamentous coliphage. It is composed of helical capsid. It is of single stranded DNA. It belong to the family Inoviridae. The word M13 derived from the word city of munich.

**REPLICATIVE FORMS:**

This is the first stage of replication. SSDNA converted into DS DNA with the help of DNA Polymerase is called replicative forms. The primer and daughter strand are synthesised by DNA polymerase and RNA polymerase

**T4 BACTERIOPHAGE:**

It is a complex structure of T-even phages (T2, T4, T6). They are tadpole shaped and composed of Icosahedral head, short neck, long tail, base plate and tail fibres. The tail is connected with the head by means of collar.

**TEMPERATE PHAGE:**

Temperate refers to the ability of some bacteriophages to display two life cycle such as lytic and lysogenic cycle. It infect E.coli K12 strain. It is used in the field of molecular biology and genetic engineering.

**TRANSPOSABLE PHAGE:**

It is a temperate bacteriophage. It belong to the family myoviridae. The word µu means multor. It is otherwise called as transposable element or transposans.

**PHAGE THERAPY:**

It is otherwise known as viral phage therapy. It is the therapeutic use of bacteriophage to treat pathogenic bacterial infections. It has been used as antitumour agents.

**CYANOPHAGES:**

Virus that infect cyanobacteria is called as cyanophages. It is found in both fresh water and marine environment. The molecular weight of DNA is 45Kbp.

**RHIZOBIOPHAGES:**

The bacteriophage infect the rhizbium called as rhizobiophages. It is used as biocontrol agent.

**MYCOPHAGES:**

It is otherwise called as mycovirus. The virus that infect the fungi is called as mycophages. They are widespread in all taxonomic groups of fungi.

**UNIT-IV ANIMAL VIRUSES**

**ADENOVIRUS**

Adenovirus infections are common in young children. This virus is associated with respiratory tract, conjunctiva & digestive tract. It was first isolated in 1953 from adenoids and tonsils.

**HERPES VIRUS**

DNA virus that cause cluster of vesicle having no tendency to burst off are called as Herpes virus. It formed giant cells as infectious parts. It undergo replication in the epithelial cells.

**POX VIRUS**

It is the largest virus that infect the vertebrates. This group contain virus that infect human, animals and insects. It causes infection with rash. It infect human, goat, sheep, rabbits, birds and swine.

**SMALL POX VIRUS**

Small pox virus is a human infection with no animal reservoir. The infectivity first appear as skin lesion and spread all over the body. Virus entered the body through the process of inhalation.

**PICORNAVIRUS**

Rhinovirus are the members of Picarno group . Rhino means Nose. Pico means Small

Rna means RNA . These viruses cause the lose f many million hours of mans work

**POLIOMYELITIS**

Poliomyelitis is a disease caused by polio virus in man and monkeys. The word polimyelities means inflammation of the grey matter of spinal cord. This isease was otherwise called as infantile paralysis.

**REYE’S SYNDROME**

It is an acute encephalopathy of children 2-16 years. Fatty degeneration of liver associated with this syndrome. Mortality rate is 10-40%. Otitis media, sinusitits, asthma,bacterial pneumonia and Aspergillosis are other symptoms

**RABIES VIRUS**

Rabies virus is a common infection spread via saliva. Rabies is a viral disease of bitten dogs. Medical help sought immediately. The symptoms may be fever, head ache, nausea, confusion, hydrophobia, excess salivation and hyperactivity.

**REOVIRUS**

Infection caused by reovirus appear and disappear within 3-7 days. It i otherwise called as common cold which is mostly observe in children attending kinder garden and elementary school.

**CALORADO TICK TEST**

Caultivirus is the subtype of reovirus symptoms are observed following experiencing tick bite in a place of Colorado. The symptoms may be fever with chills, head ache, muscle aches, loss of appetite, light sensitivity.

**H1N1**

Swine is the infection caused by a virus. It is named for a virus Pig cagnet. In 2009, a emergr of swine flu called H1N1 infect many people around the world. The symptoms include fever, cough, sore throat, chills.

**SARS**

SARS-Sever Acquired Respiratory Syndrome

The infection caused by respiratory droplets and vomits that cause infection. The symptoms are fever, coughing, dry muscle, difficult in breathing and malaise.There is no proper treatment for this infection. Oxygen therapy can be recommended.

**VIROIDS**

Viroids are plant virus contain only RNA. They do not contain protein coat. They live inside the plant cells. They are smaller than virus.

**PRIONS**

Prions are proteineceous infectious particles without nucleic acid. They are unconventional virus or slow virus agents. They usually infect fungi and mammals

**KURU**

This is a progressive neurological disease. It is reported in the tribes of new guinea linked wih a canabolistic behaviour. It is a slow viral disease. Kur means trumbling with ear. It linked with troubling with ear and postural instability.

**UNIT –V PLANT VIRUS**

**PLANT VIRUS:**

A group of virus that infect plants are called as plant virus.The plant viral disease are responsible for serious loss to agricultureal crops. Tulip mosaic infection is the first viral infection identified by the biologist.

**SYMPTOM:**

Any modification in natural function of plants is called as symptom.

**TYPES OF SYMPTOMS:**

Two types of symptoms

1. Morphological symptoms (External symptoms)
2. Histological symptoms (Internal symptoms)

**MORPHOLOGICAL SYMPTOMS:**

Disease symptoms that can be seen on the plant surface with naked eye are called external symptoms (or) morphological changes

**STUNTING**

Reduction in the growth of different parts of the plants is called stunting

**MOSAIC**

A pattern of alternate light green patches with dark green areas on leaves of plants are called as mosaic

**VEIN CLEARING**

Chlorosis of tissue adjacent to veins are called vein clearing

**VEIN BANDING**

Formation of dark green like lines on either side of veins of leaves are called as vein banding

**STRIPES**

Long narrow bands which parallel to each other found on the surface of leaves are called as stripes

**VARIEGATION**

A pattern of white patches in leaves of flowers or other green parts of plants is called as variegation

**FRUIT ABNORMALITIES**

The size of the fruit reduced to the abnormal size and skin will be shrinked is called as fruit abnormalities

**YELLOWS**

The initial symptom usually consist of clearing and yellowing of the veins in the younger leaves. The yellowing may be complete or partial or limited to chlorotic spots without mosaic pattern.

**NECROSIS**

Rapid death of cells or tissue at the site of infection is called as necrosis

**LEAF ROLLING**

The margin of infected leaves fold upward or downwards and turns on its axis to form a roll is called as leaf rolling

**CURLING**

Abnormal bending of shoots or leaves due to virus infection is called as curling

**RINGSPOTS**

The circular areas in the green parts of the plants are called as ringspots

**HYPERPLASIA**

Excessive growth of virus infected tissue in the form of tumour like growth is called as hyperplasia

**HYPOPLASIA**

Weakening of infected tissue is called as hypoplasia.

**AMORPHOUS GRANULE /CYSTALLINE**

The aggregate of virus particles in more or less crystalline form of virus induce proteins or other materials to form inclusion bodies called as amorphous granule or crystalline

**SUBVIRAL AGENTS:**

The subcellular entities which are more like viruses but not true virus is called subviral agents.

**TYPES OF SUBVIRAL AGENTS**

Three types

* Viroids
* Satellite virus
* Prions

**VIRUSOIDS**

Viroids are naked circular single stranded RNA that are not at all associated with capsid or helper virus is called as virusoids

**ANSWER IN SHORT NOTES (5 MARKS)**

**UNIT-I HISTROY & CLASSIFICATION**

1. Mention the characters of virus
2. Short notes on the properties of virus
3. How virus distinguished from bacteria
4. State the contribution of Louis Pasteur
5. State the contribution of Anton Van Leewanhoek
6. Mention the size and shape of the virus
7. Write about the viral nucleic acid and viral enzymes
8. Write about viral envelope
9. Mention about the structure of viral capsid
10. Short notes on viral carbohydrates and viral proteins
11. LHT system of classification of virus
12. ICTV system of classification of virus

**UNIT-II CULTIVATION OF VIRUS**

1. Mention the cultivation of virus
2. Short notes on the types of culture of virus
3. Write about the semi-continuous cells
4. State the cultivation of virus in embryonated egg
5. Feature of using live animals as laboratory uses.
6. Mention the steps for the cultivation of plant virus.
7. Write about the heamaglutination and transformation assay
8. Write about plaque assay and fluorescent focus assay
9. Mention about the steps for the isolation of viral proteins
10. Short notes on viral purification methods
11. Short notes on viral assay
12. Write about the electron microscopic examination

**UNIT-III BACTERIOPHAGE**

1. Mention the properties of bacteriophage
2. Short notes on the structure of bacteriophage
3. Write about the phage therapy
4. Write about M13 phage
5. Feature of T4 bacteriophage
6. Mention the features of lambda phage
7. Write about the temperate phage
8. Write about transposable elements
9. Structure of µu phage
10. Short notes on Rhizobiiophages
11. Short notes on cyanophages
12. Write about the mycophages

**UNIT-IV ANIMAL VIRUS**

1. Structure of Adenovirus .
2. Short notes on the Herpes virus
3. Write about the Pox virus
4. Write about Small pox
5. Feature of Picornavirus
6. Mention the features of polio virus
7. Write about the Influenza virus
8. Write about Rhabdoviridae
9. Structure of Reovirus
10. Short notes on H1N1
11. Short notes on SARS
12. Write about the viroids
13. Structure of prions in animals
14. Prions in human

**UNIT-V PLANT VIRUS**

1. Write about the symptoms of plant virus
2. Short notes on the external symptoms of plant virus
3. Write about the internal symptoms of plant virus
4. Write about structure of CaMV
5. Structure of TMV
6. Mention the features of Tomato spot wilt virus
7. Write about the Rice tungro mosaic disease
8. Write about Potato virus
9. Structure of subviral agents
10. Short notes on virusoids
11. Short notes on satellite virus
12. Write about the viroids
13. Features of plant virus
14. DNA containing virus

**EXPLAIN BRIEFLY (TEN MARKS)**

**UNIT-I HISTORY & CLASSIFICATION**

1. Explain the classification of virus in detail
2. Explain the history of virology in detail
3. Explain about structure of virus in detailed manner.

**UNIT-II CULTIVATION OF VIRUS**

1. Explain the classification of virus in detail
2. Explain the history of virology in detail
3. Explain about structure of virus in detailed manner.
4. Explain the cultivation of virus in detail
5. Explain the purification of virus in detail
6. Explain about methods adopted for the viral assay detailed manner.
7. Explain the analysis of viral components in a brief manner

**UNIT-III BACTERIOPHAGE**

1. Explain the structure and lifecycle of M13 phage in detail
2. Explain the structure and lifecycle of T4bacteriophage in detail
3. Explain about structure and lifecycle of lambda bacteriophage in detailed manner.
4. Explain the classification of bacteriophage in detailed manner

**UNIT-IV ANIMAL VIRUS**

1. Explain the structure, pathogenesis and treatment of rabies in detail
2. Explain the structure, pathogenesis and treatment of orthomyxovirus in detail
3. Explain the structure, pathogenesis and treatment of Herpes virus in detail
4. Explain the structure of prions in detailed manner
5. Explain the structure, pathogenesis and treatment of small pox in detail

**UNIT-V PLANT VIRUS**

1. Explain the structure, pathogenesis and treatment of TMV in detail
2. Explain the structure, pathogenesis and treatment of CaMV in detail
3. Explain the structure, pathogenesis and treatment of RSBV in detail
4. Explain the structure of subviral agents in detailed manner
5. Explain the classification of plant virus in detail.

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