
WINTER– 14 EXAMINATION

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Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

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Q. 1 Attempt any FIVE of the following. (2 marks for each question.)

10marks

(a) Define the following: (1 mark each)

(i) Health Education

Health education is a process that informs, motivates, and helps people to adopt and maintain healthy practices and lifestyles, advocates environmental changes as needed to facilitate these goals and conducts professional training and research to the same end.

(ii) Community Pharmacy:

A **community pharmacy** is a healthcare facility that provides pharmaceutical services to the **community** and dispenses medicines and typically involves a registered **pharmacist**.

(b) Name vitamins given: (1/2 marks each)

i) Bleeding disorder: Vitamin K

ii) Keratomalacia: Vitamin A

iii) Megaloblastic anaemia: Vitamin B12 (Cyanocobalamin) or Folic Acid

iv) Rickets: Vitamin D

(c) Define the following terms (Any two) (1 mark each)

i) Family planning is a way of living and thinking that is adopted voluntarily upon the basis of knowledge, attitude and responsible decisions by individuals and couples in order to promote the health and welfare of the family group and thus contribute effectively to the social development of country.

ii) Demography is the scientific study of human population. It is mainly concerned with (i) changes in population size, (ii) the distribution of population.

iii) Contraceptive is an agent used to prevent conception i.e. pregnancy.

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d) Define the following terms (any two) 1 mark each

- i) **Arthropod borne diseases:** the diseases transmitted by the arthropods i.e. insects.
- ii) **Incinerator:** A device or apparatus used for burning the garbage (waste material) at high temperature.
- iii) **Noise:** It is defined as wrong sound at wrong time at wrong place.

e) Define the term “Stains” (1 mark) State purpose of staining (1 mark)

Stain is defined as dye or chemical reagent used for colouring microorganisms. **(1 mark)**

The purpose of microbial staining is to study the overall structure of the microorganisms, to identify their internal structures and to help identify and differentiate similar organisms. **(1 mark)**

f) What are non-communicable diseases? (1 mark) Give three causes (1 mark)

Non-communicable disease are the diseases which are not transmitted directly or in-directly from one person to another, but are caused due to multiple causes.

Causes: (any three can be written).

Hereditary, Life style, Dietary factor, Environmental factor, bad habits (smoking, alcoholism etc.)

g) What do you know about: (1 mark each)

- i) **Epidemiology** is the study of the distribution and determinants of health related events and diseases in the population and also the application of this knowledge to control health problems.
- ii) **Case and Carrier:** Case is the one with active disease and carrier is the one who carries the infection but is asymptomatic.

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Q .2 Answer any Four (3 ½ marks each)

14 marks

a) Different aspects of health (1 ½ marks). Explain any one (2 marks)

(Any three of the following can be mentioned.1/2 mark each.)

- 1) Physical health
- 2) Mental health
- 3) Social health
- 4) Spiritual health

Explain any one of the following (2 marks)

1. Physical health: It is the perfect functioning of the body i.e. a state in which every cell and every organ is functioning at optimum capacity and in perfect harmony with the rest of body. The signs of physical health are:

- 1) Good complexion, clear skin, bright eyes
- 2) Lustrous hair with a body clothed with firm flesh, not too fat
- 3) Sweet breath, sound sleep
- 4) Smooth, easy, coordinated body movements
- 5) Good appetite, regular activity of bowel and bladder
- 6) All the organs of the body are of unexceptional size and function normally

2. Mental health: it is defined as a state of balance between the individual and surrounding world, a state of harmony between oneself and others, has self-esteem, self-confidence, self-control and has respect for others.

A mentally healthy person is free from internal conflicts; he is not at 'war' with himself.

He gets along well with others. He accepts criticism and is not easily upset

He knows himself i.e. his needs, problems and goals

He is able to cope up with anxiety and stress, and so he is able to face the problems and solve them intelligently.

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3. **Social health:** It implies harmony and integration within the individual, between each individual and other member of society and between individuals and the world in which they live.

4. **Spiritual health:** it plays a role in health and disease. It refers to that part of the individual which reaches out and strives for meaning and purpose in life.

b) **Define “Prevention of disease” (1/2 marks) .Explain the concept of prevention of diseases. (3 marks)**

Prevention of disease is defined as ways/methods to promote and preserve health, restore it when it is impaired and to minimize the sufferings. **(1/2 marks)**

Concept of prevention of diseases: Prevention can be done at 3 levels: **(1 mark for each level)**

I) Primary prevention:

It can be defined as “action taken prior to the onset of disease, which removes the possibility that a disease will ever occur”.

This involves:

- 1) Primordial prevention
- 2) Population or mass strategy
- 3) High risk strategy

II) Secondary prevention:

It can be defined as the “action which halts the progress of a disease at its incipient stages and prevent complications.”

This involves early detection and treatment of the disease.

III) Tertiary prevention:

It is taking the steps when disease has already progressed i.e. late pathogenesis phase. It includes measures to reduce or limit impairments and disabilities, minimizes sufferings caused by diseases and to promote the patient’s adjustment to untreatable conditions.

Rehabilitation is the main mode of intervention.

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c) Define the following terms

i) Host (1 mark)

A person or animal which allows lodgement of an infectious agent in its body.

ii) Agent (1 mark)

The disease agent is defined as a substance living or non living, or a force tangible or non tangible, the excessive presence or lack of which may initiate or perpetuate a disease process.

iii) Intervention (1/2 mark)

Any measure taken to intervene or interrupt the natural sequence of a disease is termed as intervention.

iv) Disease (1 mark)

It is a state of deviation from normal state of complete physical, mental, or social well being.

d) What is cancer? (1 mark) How it is controlled? (2 ½ marks)

Cancer is a term used for group of diseases characterized by:

- 1) An abnormal and purposeless multiplication of cells.
- 2) Ability to infiltrate the adjacent tissues or even distant organs;

Measures to control cancer: (any 5 points for 2 ½ marks, 1/2 mark for each point)

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It is possible to control many of the causative factors of the cancer in the general population as well as in particular occupational groups by following measures:

- 1) Control of tobacco and alcohol consumption.
- 2) Improvement of personal hygiene.
- 3) Reduction in the exposure to the amount of radiation.
- 4) Protection of workers from industrial carcinogenic chemicals.
- 5) Immunization against hepatitis B virus.
- 6) Testing of food, drugs and cosmetics for their carcinogenic activity.
- 7) Control of air pollution.
- 8) Balanced diet
- 9) Early detection and treatment of precancerous lesions such as warts, chronic gastritis, chronic cervicitis, etc.
- 10) Cancer education to motivate people for early diagnosis and early treatment.
- 11) Treatment facilities should be available to all cancer patients.

e) Discuss type of disinfectants with examples.

I) Natural agent: (1/2 mark)

a) Sunlight: the ultraviolet rays of sunlight are able to destroy many bacteria and viruses. Articles like linen, furniture, and bedding can be disinfected by exposure to direct sunlight for several hours.

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b) **Air:** exposure to open air causes drying which is lethal to most of the bacteria.

II) Physical agents :(1 ½ marks)

a) **Burning:** this is an excellent method of disinfection of any contaminated material which is not expensive.e.g.dressings, swabs can be burnt.Faeces can be disposed of by burning.

b) **Hot air:** it is useful for sterilizing the articles like glasswares, syringes, swabs, dressings, surgical instruments, etc.It has no penetrating power, and so bulky items cannot be disinfected by hot air.

c) **Boiling:** it provides wet heat at a temperature between 90°C to 100°C, which can destroy most of the bacteria within 10-15 minutes but not the spores.

d) **Autoclaving:** sterilizers which operate at high temperature and pressure are called autoclaves. They generate steam under pressure which is the most effective sterilizing agent. It is used for sterilizing surgical instruments, linen, culture media, glass articles, etc.

e) **Radiation:** In this the objects to be sterilized are packed in plastic bags before radiation, and they will remain sterile until open.

III) Chemical agents :(1 ½ marks)

a) **Phenol and cresol:** Phenol commonly used as a disinfectant is crude phenol which is a mixture of phenol and cresol. It is used for disinfection in 5-10 % concentration.

b) **Chlorhexidine:** one of the most useful skin antiseptics. Creams and lotions containing 1% chlorhexidine are recommended for burns and hand disinfection.

c) **Dettol:** It is a relatively non-toxic antiseptic. Dettol 5% is suitable for disinfection of instruments, plastic equipments when kept in contact with Dettol for at least 15 minutes.

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d) Bleaching powder or chlorinated lime: It kills most of the organisms in 1-3% concentration. It is used for disinfecting water, faeces and urine.

f) Write a note on ‘cold chain storage of vaccines.’ (3 and ½ marks)

Vaccines are biological products and can lose their potency if not stored appropriately.

The vaccines should be stored at low temperature starting from the manufacturer to the point of use. The maintenance of temperature throughout the transportation, storage and up to administration is called the cold chain. The cold chains maintenances are necessary because on exposure to high temperature vaccines lose potency and their life is shortened. All the vaccines have different heat sensitivities. Oral polio vaccine is the most sensitive to heat; next in order are measles, BCG, DPT, DT and TT.

If polio and measles vaccines are to be stored for a longer period as in the State or district storage centre, it can be kept at a temperature below 0°C or in the freezer compartment of the refrigerator, but it should not be repeatedly frozen and melted. DPT, DT, TT and BCG should not be frozen. No vaccine should be exposed to direct sunlight.

Devices used to maintain cold chain: Refrigerators, Walk in coolers, ice bags, thermocol Boxes, freezers etc.

Q. 3. Answer any FOUR of the following: (3 & ½ marks for each question.) 14 marks

a) What are proteins? Explain sources and deficiency of proteins. (What are proteins- 1mark, Sources 1 mark and deficiency of proteins 1½marks)

These are complex organic nitrogenous compounds and are composed of carbon, hydrogen, oxygen, nitrogen, sulphur and occasionally phosphorous, iron and other elements. **(1 mark)**

Sources: Plant sources- pulses, beans, cereals, oil seeds, nuts, soyabean. **(½mark)**

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Animal sources- fish, red meat, eggs, milk, cheese, etc. Animal proteins are far superior as they are complete proteins i.e. they carry all EAA needed for the body. (½mark)

Protein Deficiency: Protein Energy Malnutrition (PEM) is most common health problem of children in India. (½mark)

It is manifested in following forms;

1. Kwashiorkor: (½mark)

It is protein deficiency disease seen in children of group 1 to 4 years.

Symptoms: Edema, depigmentation of hair and hair loss, GI disturbances as anorexia and diarrhoea, hepatomegaly, mental changes, sometime muscle wasting, apathy, etc.

Treatment: Adequate protein diet along with treating root cause of deficiency disorder

2. Marasmus: (½mark)

It is deficiency of proteins and calories; the disorder common in infants below 1 year.

Symptoms: Severe muscle wasting, severe retardation of growth, thinning of limbs, change in hair texture, diarrhoea, fat loss, etc.

Treatment: PEM is treated by giving adequate and judicious use of cheap, locally available cereal-pulses based diet or milk. About 3.5 g proteins/kg body wt/day is required.

b) What are the sources and functions of Vitamin – E? (1 ½ marks for sources & 2 marks for functions)

Vitamin E: Sources-Foods rich in polyunsaturated fatty acids are also rich in vitamin E. Most rich source is vegetable oils and egg yolk. Other sources are green cabbage, wheat germ oil, milk, butter, etc. (1 ½ marks)

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Functions: (any of the 4 functions mentioned below for 2 marks, i.e. ½ marks each)

- 1) It works as important biological antioxidant.
- 2) It mainly prevents oxidation of unsaturated fatty acid
- 3) It plays important role keeping cell membrane integrity.
- 4) It is required for keeping hair and skin healthy.
- 5) It plays role in maintaining all muscular tissues healthy.
- 6) Probably it functions in reproduction physiology (anti-sterility vitamin) as revealed in experimental animals.

c) What is ‘Balanced Diet ’? Give its advantages. (Explanation of the term 1 mark, Composition of balanced diet 1 mark, advantages 1 ½ marks)

Balanced Diet : Balanced diet is such diet that contains different types of foods in correct amounts and proportions so that body demand for amino acids, fats, carbohydrates, minerals, vitamins, other nutrients and energy demand of body is sufficed; so that promotion, protection and maintenance of health is done.(1mark)

Composition of balanced diet: It varies with age, sex, physical activity performed by person and physiological state as pregnancy, lactation, etc. It ideally should contain all nutrients in “recommended daily allowance” (RDA) amounts. The dietary constituents as proteins, amino acids, fats, carbohydrates, minerals, vitamins, fibers and water; all in adequate amounts design the balanced diet. (1 mark)

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Advantages: (any 3 of the following points for 1 ½ marks i.e. ½ marks for each)

- 1) Keeps body healthy.
- 2) Avoids nutrient deficiency diseases.
- 3) Prevents ill effects of hyper-intake of diet constituents.
- 4) Protects body in energy crisis for certain period at least.
- 5) It promotes health of all individuals of different age groups, different sex, etc.
- 6) It helps to increase immunity so as to protect body against infections.

d) Give a brief account of the “Population Problem of India”

Population Problem of India: It is because of extra huge population of India, the country is facing variety of problems as –

- 1) India has only 2.4 % of total land area of the world and possesses 16.7 % of total world population. Present population of India is about 125 crores. **(1/2 mark)**
(Any three of the following points can be written, 1 mark for each point)
- 2) **Biological consequences:** Young population is growing tremendously. This causes a great pressure **on pediatric care, education and health** and other such facilities.
- 3) **Economic consequences:** Population adversely affects the rate of per capita income. Majority of India's total population lives below poverty line. Poverty is one of the important causative factors in the epidemiology of diseases.
- 4) **Social consequences:** More population means less job opportunities, inadequate education facilities, increased illiteracy, inadequate and poor housing facilities, overcrowding which can lead to deterioration in law and order situations.
- 5) **Health consequences:** Malnutrition, inadequate medical facilities can cause higher death rates in infants and children. There can be high maternal deaths. Increased population leads to increased industrialization, which finally causes pollution problems.

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e) Define ‘Fertility’. State the factors affecting fertility. (Fertility definition 1 mark, any 5 factors for 2 ½ marks i.e. ½ mark for each).

‘Fertility’ is defined as actual child bearing i.e. procreation OR the ability to produce offsprings or children.

Factors affecting fertility are –

- 1) Age of marriage
- 2) Duration of married life
- 3) Spacing of children
- 4) Education
- 5) Nutrition
- 6) Economic status
- 7) Cast and religion
- 8) Family planning
- 9) Other factors which are physical, social and cultural factors like place of woman in society, widow remarriage, breast-feeding, housing, etc.

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f) Describe any three IUDs used by females for contraception. (Meaning of term IUD ½ marks, description of three IUDs 3 marks i.e. 1 mark each).

IUD means intrauterine device, i.e. contraceptive, a family planning device used by women.

- 1) Lippes loop: It is first generation IUD. It is made up of polyethylene or other polymers. It is a double 'S' shaped device with nylon thread attached to it. Failure of device is due to heavy bleeding and excessive pain.
- 2) Copper T: It is second generation IUD, the combination of plastic and copper. Copper has antifertility effect, so helps to work for contraception. Different variants of this version are available as Nova T, ML-Cu-250, etc. Example- copper T 200, where the number 200 represents surface area in sq mm of the copper with device. It remains active for almost 5 years. Major advantages over earlier version of IUD are- decreased size of IUD, minimizing side effects as lumbar pain and heavy bleeding.
- 3) Progestasert: It is T shaped device with slow release depot of progesterone; the hormone possessing contraceptive effect. It needs replacement after 5 years. Advantage: it reduces blood flow during menstruation cycle, so very much useful in India, where anemic women is a common problem.

Q. 4 Answer any FOUR of the following: (3 and ½ marks for each question) 14 marks

a) Define 'First Aid'. What is its scope and objectives?

First Aid (Definition): First aid is defined as the immediate treatment given to the accident victim or sudden illness, quickly and correctly before medical help is made available. **(1 mark)**

Scope: (any two points for 1 mark, ½ mark each)

- 1) To preserve life of casualty
- 2) Minimize effects of injury so as to prevent further complications

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- 3) To relieve pain and sufferings
- 4) To arrange for hospitalization of casualty or to the doctor for further treatment

Objectives: (any 3 objectives 1 ½ marks i.e. ½ mark each)

- 1) Careful evaluation of situation
- 2) Maintenance of respiration and functioning of heart of casualty
- 3) Control of bleeding
- 4) Prevention or management of shock
- 5) Dressing of wounds
- 6) Providing splint to the fractured part, when possible

b) Define ‘Burns’. Explain first aid treatment of burns. (Definition -1 mark, First aid treatment 5 points, ½ mark for each point).

Definition of Burns: Burns are defined as injuries caused by dry heat as flame, fire or hot metal; or by chemicals as strong acids or strong bases, or by electricity or radiation. **(1 mark)**

First aid treatment for burns: (Any 5 points, ½ marks for each point)

- 1) Assure casualty of life being saved, if conscious,
- 2) Burnt area should be cooled by putting plenty of water or cloth soaked in cold water.
- 3) Remove clothing of casualty by cutting around, if possible
- 4) Keep casualty in lie down position
- 5) Do not disturb blisters.

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- 6) Cover burnt area by large dressings or clean bed sheet.
- 7) Antiseptic lotion, ink, oil, flour, baking soda, etc. should not be applied on burnt area. In fact burnt area should not be touched unless it is most necessary.
- 8) Ornaments, belt, shoes, etc. should be removed immediately from body of casualty, since if limbs swell, such articles may cause gangrene.
- 9) If conscious, give to the casualty frequent sips of water.
- 10) In case of chemical affected burns, wash-off all chemical affected area with plenty of water.
- 11) If there is delay in hospitalization, normal saline or Ringer lactate solution may be given by IV route. This prevents patient from shock. Suitable analgesic may be given by IV route.

c) Give a brief account of the elements of minor surgery and dressings.

The 'Elements of Minor Surgery and Dressings' include mainly:

(Below mentioned list for 1 mark)

- 1) Common surgical instruments
- 2) Glass and plastic instruments
- 3) Rubber instruments
- 4) Sutures and ligatures with suturing needles
- 5) Dressings

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(Each of the below mentioned point for ½ mark)

- 1) Common surgical instruments- These include ‘towel clips’ (different types), ‘forceps’ viz. sponge holding forcep, Cheetle'sforcep, artery forcep, etc. ‘scissors’ as curved, straight,special type, etc.; along with scalpels, needles and needle holder.
- 2) Glass and plastic instruments- These include mainly the BD syringes as *Tuberculin syringe*, *All glass syringe*, *Leurlock syringe*, etc.
- 3) Rubber / PVC - These include surgical gloves, urinary catheters, Ryle’s tube, etc.
- 4) Sutures and ligatures- Sutures are any material used to sew or stitch together tissues until healing occurs. **Types** : Main two types as-
 - a) Absorbable: These are absorbed in the tissue. These can be: i) Surgical gut or catgut, ii)Collagen sutures and iii) Others as Ribbon gut, Fascia lata, etc.
 - b) Nonabsorbable: These are of types as i) Natural-Silk or cotton or linen ii)Synthetic iii)Dermal iv)Metallic as stainless or tantalum, etc.

Needles: These are of different types as – Straight, Round shaft curved, Triangular shaft curved, Flat shaft curved, etc.

- 5) Dressings- It is term applied to wide range of materials used for dressing of wound
These are of different types as: Primary, Absorbents, Bandages, Adhesive types and Protective.
There are different “antiseptics” commonly used as- AF Lotion, Eusol, Magsulf solution, Tincture benzoin, Tincture iodine.

d) Define the following terms-

(i) Microbiology: It is study of microorganisms with respect to their cytology, physiology, reproduction and activities. **(1 mark)**

(ii) Colony: It is macroscopic growth of single microscopic cell that grows on solid growth medium. **(1 mark)**

(iii) Mixed Culture: It is culture which contains growth of two or more organisms. **(½ mark)**

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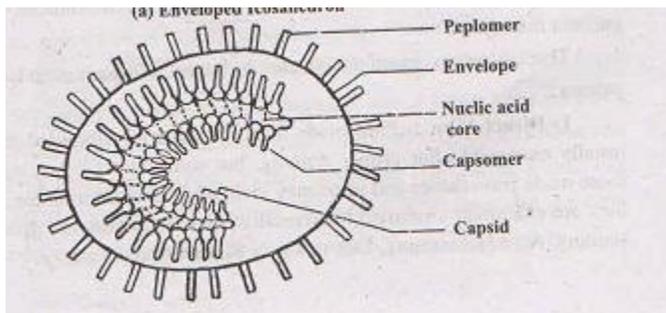
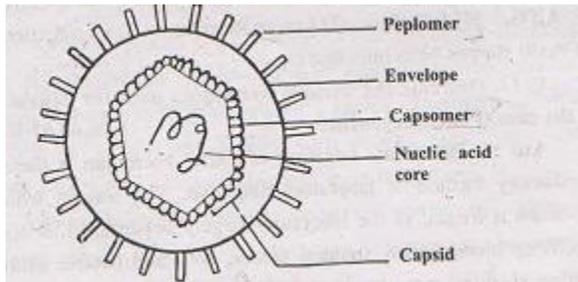
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(iv) Differential Staining: It is staining method which differentiates morphologically similar organisms, by staining with more than one stain. (1 mark)

e) Describe general structural features of viruses with the help of a well-labelled diagram. (1 marks for labeled diagram and 2 and ½marks for structural features description).



(Any one of the above diagrams can be considered)

General Structural Features: 1) Virus is ultramicroscopic entity on boundary of living and nonliving.

- 2) It does not possess the cellular organization.
- 3) Structurally it possesses a protein coat called 'capsid', enclosing nucleic acid at central core.
- 4) Capsid is made up of structural units called capsomers, where each capsomer is made up of 7 to 8 monomers.
- 5) Virus carries centrally located nucleic acid, either DNA or RNA but never the both.

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6) Virus particle may be ‘enveloped’ or naked i.e. without envelop. Envelop may show projections called spikes.

7) Virus may show icosahedral (cubical) form or helical (rod like) form of structure.

There may be combination of these two forms as seen in ‘bacteriophage’, with additional parts as neck, collar, base plate and tail fibres.

8) Pathogenicity of virus is because of nucleic acid, while antigenicity is because of capsid and envelop (when present). (any 5 points, 2 and ½ marks for features).

f) Name the various methods of isolation of bacteria. Describe in detail any one method.

Methods of Isolation of Bacteria –

- 1) Streak plate method
- 2) Pour plate method
- 3) Spread plate method
- 4) Single cell isolation by Micromanipulator

(Names of any three of the above methods 1 and ½ marks)

Description of method for Isolation of pure Culture:

(Any one of the following methods for 2 marks)

Following methods are commonly used to isolate bacteria from a mixture.

i) Streak Plates Method

A plate of solid medium (nutrient agar) is allowed to dry in an incubator for about 30 min to dry the surface. Then by using bent wire which has been sterilized by heating directly on the flame, is dipped in an inoculum. With this wire the inoculum is

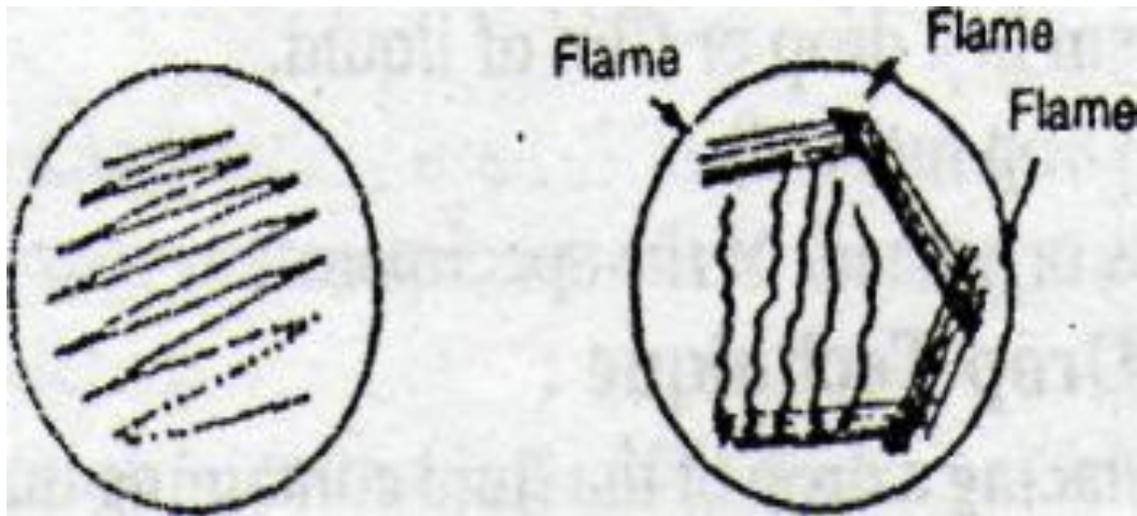
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streaked across the surface of the agar medium so that individual cells become separated from each other. The inoculum can be streaked on the agar surface by methods as shown in the following figures. These plates are incubated at 37°C for about 18-24 hrs, after which individual colonies can be observed on the agar surface.



iii) Spread Plates Method

A drop of diluted sample of culture specimen is placed on the surface of an agar medium, and this drop is spread over the entire surface using a sterile bent glass rod. These plates are incubated at 37°C for about 18-24 hrs, after which individual colonies can be observed on the agar surface.

iii) Pour Plates Method

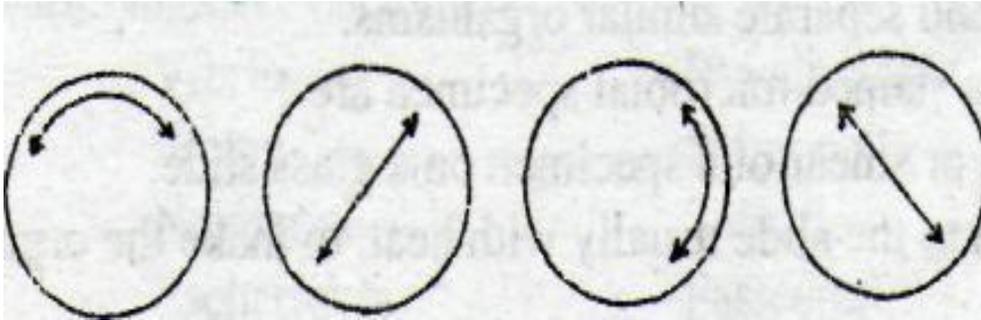
In this method the initial suspension of the culture is diluted to a concentration of about 100 microbes/cm³. This diluted specimen (1ml) is pipetted out in the empty petridishes and mixed with nutrient agar by moving gently in the directions as shown in the figure.

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The temperature of agar is not allowed to exceed 45°C to avoid damage to the microorganisms. After solidification the plates are incubated. In this procedure the colonies will grow both on and below the surface, because some of the cells are trapped within the agar medium when it solidifies.

iv) Single cell isolation by Micromanipulator:

- i) The hanging drop preparation of specimen is prepared.
- ii) The needle of micromanipulator is inserted in hanging drop.
- iii) By pointed tip of needle of micromanipulator single isolated cell of bacterium is lifted and taken out.
- iv) Needle tip with isolated single cell is dipped in sterile growth medium and this tube is incubated at appropriate incubation conditions.

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Q.5 Answer any **FOUR** of the following: (3 ½ marks for each answer)

14 marks

a) Explain the sources of water with examples.

1. Rain water

2. Surface water

3. Ground water

Rain water: (1/2 mark)

Rain is the primary source of all water. It is the purest water in nature. It is clear and very soft water but tends to become impure as it passes through atmosphere.

Surface water :(1 ½ mark)

It originates mainly from rain water. Majority of Indian cities and town depends upon surface water.

a) Reservoir: These are artificial lakes constructed usually with earthwork, in which large quantity of water is stored. Water from reservoir is of fairly good quality. It is usually clear, palatable and soft water.

b) River: Many cities depend for their water supply on rivers. The river water is usually polluted with sewage, industrial waste, man and animal washing etc.

c) Tanks: Tanks are large excavation in which surface water is stored. It is contaminated by silt, colloidal matter, washing of humans and cattle. Because of high degree of contamination tank water is not suitable for drinking.

a) **Ground water:(1 ½ mark)**

The part of rain water which sinks in to the ground and reaches subsoil to varying depths is known as ground water. It is naturally filtered through ground. The usual ground water sources are wells and spring.

a) Wells: There are different types of wells likely shallow well, deep well, tube well and artesian well.

b) Springs: Springs are natural outlets of water held under pressure by the impermeable layer. It comes out at places where the geological conditions are favorable.

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b) Explain various steps of 'Slow Sand Filtration Method' for water purification :(3 ½ marks)

The steps of a slow sand filter are as follows:

1. Supernatant raw water: The supernatant water above the sand bed measures in depth 1-1.5 metres. Its purpose is dual, firstly by the resistance of filter sand bed the water is retained above the sand bed and this period of storage provides an opportunity for natural purification by oxidation and sedimentation, secondly water is forced by the gravity downwards to facilitate filtration. **(1/2 mark)**

2. Graded sand bed: The sand bed is the most important component, as this is filtering the water. This consists of sand of different particle sizes and the thickness. The finest sand is on the top and comparatively coarse sand is below that. Water percolates through the beds very slowly and during this, is subjected to mechanical straining, sedimentation, adsorption, oxidation and bacterial action. This filter is called as biological filter because the surface of the sand gets covered with slimy growth (vital layer or biological layer), which consists of thread like algae and numerous forms of life including plankton, diatoms and bacteria. This vital layer removes organic matter, holds back bacteria and oxidizes ammoniacal nitrogen into nitrogen and helps in yielding bacteria free water. **(1 ½ marks)**

3. Gravel support: Below the sand bed is the layer of gravel which supports the sand bed. The upper part consists of fine gravel and in the lower part is coarse gravel. **(1/2 mark)**

4. Underdrainage system: Just below the coarse gravel there is a network of porous or perforated pipes. In addition to an outlet to filtered water this network also provides support to the sand and gravel layers. **(1/2 mark)**

5. A system of filter control valves: All the above components are placed inside a box called as a filter box. The walls of the box are made of stones, bricks or cement. The whole filtration

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process is controlled by filter control valves so that filtered water is available at a desirable rate.

(1/2 mark)

c) What is solid waste? (1 mark).How it is disposed off? (2 ½ marks)

Solid wastes are the unwanted, discarded material from domestic, commercial, industrial and agricultural operations. It is also called as refuse or litter. It comprises of dust, ash, vegetables, fruits, paper and packaging of all type, rags and other fabrics, combustible, non combustible debris.**(1 mark)**

Solid waste is disposed off by using following methods.

(1/2 mark for each method)

1. **Dumping:** dry refuse is mainly dumped in low lying areas which help not only in disposal but also in reclamation of land. By the action of bacteria, the volume of the refuse decreases considerably in volume and is converted gradually into humus. It is not an ideal method.
2. **Controlled tipping or sanitary landfill:** this is the most satisfactory method of refuse disposal. In this method a trench is dug. The refuse is compactly dumped in these pits and at the end of each working day is covered with earth, when the trench is full; again it is covered with earth and is compacted. In this method the chemical and bacteriological processes decompose the refuse into simple substances with generation of heat.
3. **Burning:** Refuse can be disposed off hygienically by burning. Hospital refuse which is particularly dangerous is best disposed off by burning.
4. **Composting:** it is a method of combined disposal of refuse and night soil. The basic principle is, when the refuse and night soil (excreta) are dumped in a pit and covered with earth there is anaerobic decomposition. The heat produced during decomposition kills the organisms and ultimately we get compost, which is used as manure.

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5. **Burial:** it is useful for small scale disposal like camps. In a small trench or pit the refuse is collected and at the end of each day it is covered with 20-30 cm of earth. The contents of the pit may be taken out after 4-6 months and used on the fields.

d)What are the sources of air pollution? Give the effect of air pollution on health.

Sources of Air pollution :(2 marks)

The air is rendered impure by

1. Respiration of human beings and animals
2. Combustion of coal, gas, oil etc.
3. Decomposition of organic matter
4. Traffic, industries - which give off dust, fumes, vapours, harmful gases
5. Industrial and domestic combustion of coal, oil and other fuel is the source of smoke, dust, and sulphur dioxide.
6. Chemical industries, textile industries, oil refineries, fertilizer factories etc contribute to air pollution.
7. Automobiles like heavy and light vehicles, aircrafts, trains and other forms of transport contribute to air pollution by emitting hydrocarbons, carbon monoxide, lead, nitrogen oxide and particulate matter. Strong sunlight converts some of these hydrocarbons and nitrogen oxides into photochemical pollutant of oxidizing nature.

Effects of air pollution :(1 ½ marks)

1. Air pollution causes several effects on health and it has contributed to increase in morbidity and mortality.
2. Respiratory tract disorders are common such as asthma, bronchitis and lung cancer.
3. Air pollution also affects respiratory system of animals.

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4. It also causes retardation of growth in plants, spotting, burning of leaves etc.

e) Define the term 'STDs? Give examples. Discuss prevention STDs.

Sexually Transmitted Diseases (STD):

STDs are a group of communicable diseases that are transmitted predominantly by sexual contact and caused by wide range of bacteria, viruses, protozoa and fungi. **(1 mark)**

STDs include syphilis, gonorrhoea, AIDS, chancroid, donovanosis etc. **(1/2 mark)**

Prevention of STDs: (Any of the following 8 points for 2 marks)

1. One should abstain from sexual activity.
2. Sexual activity should be limited to non-infected partner.
3. Avoidance of contact with blood, semen, vaginal fluids.
4. Condom should be used during the sexual intercourse.
5. One should abstain from risky sexual activity: oral or anal sex.
6. One should abstain from sex with high risk people: prostitutes, etc.
7. One should never share a needle for injections.
8. Personal hygiene should be maintained.
9. Screening of High risk groups: These groups are young adults sharing common sex partners, drug addicts, prostitutes, truck drivers and those people who remain away from their homes for longer time.
10. Creating awareness through health education.

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f) Classify hormonal contraceptives. Give at least two advantages and two disadvantages of hormonal contraceptives.

Classification of Hormonal Contraceptives :(1 ½ marks)

1. Oral pills—

- a. Combined pills
- b. Progestogen only pill
- c. Post-coital pill
- d. Once-a-month pill (long acting)

2. Depot (slow release) formulations—

- a. Injectables
- b. Subcutaneous implants
- c. Vaginal rings.

Advantages: (Any four of the following advantages for 1 mark)

1. Very effective, reversible method which protects against uterine and ectopic pregnancy as it inhibits the ovulation.
2. Safe and easy to use.
3. Does not interfere with sexual pleasure.
4. Decreases menstrual blood loss, menstrual cramps and regularizes menstrual cycle.
5. Protects women against anemia by minimizing blood loss.
6. Protects from cancer of ovary, uterus and benign breast.



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Disadvantages :(Any four of the following disadvantages for 1 mark)

1. Headaches: Headaches may start in women who have not previously had headaches, or can get worse in those who do.
2. Depression: Depression (sometimes severe) and other mood changes may occur.
3. Nausea and vomiting: This side effect usually goes away after the first few months of use or can be prevented by taking the pill with a meal.
4. Breast tenderness: Your breasts may become tender or may get larger. Breast tenderness is relatively common during the first month of BCPs and uncommon thereafter.
5. Spotting: Spotting or bleeding between menstrual periods is very common in the first cycle of pills or if pills are missed or taken late.
6. Weight gain: Some women report slight weight gain. Weight gain is often caused by fluid retention or estrogen-induced fat deposits in the thighs, hips, and breasts. Weight gain may also be related to a reduction in physical activity or increased intake of food. In some women the androgenic effects from the progestins in their OCs can increase their appetite.
7. Sexually transmitted diseases: Birth control pill does not offer any protection against sexually transmitted infections.

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6. Tabulate following communicable diseases by giving causative agent, mode of transmission. (Any seven)

14 marks

Sr. No.	Disease	Causative agent (1/2 mark)	Mode of Transmission (1½ mark)
a.	Tuberculosis	Mycobacterium tuberculosis	<p>It is mainly transmitted by droplet infection and droplet nuclei. The most common source is the sputum of the patients with pulmonary tuberculosis. Coughing can produce large number of droplets. Fresh droplets carry viable organisms. The frequency and vigour of cough and the ventilation of the environment influences the transmission of infection.</p> <ul style="list-style-type: none">• It can thrive in organs of relatively high oxygen tension such as apices of the lung, the renal parenchyma the growing ends of the bones and the cerebral cortex• It is also tolerant to the acid environment of the stomach and it has been isolated from the gastric contents of the patients



			suffering from tuberculosis.
b.	Diphtheria	Corynebacterium diphtheriae.	<ul style="list-style-type: none"> It is spread by droplet infection from infected patients or carriers. Transmission through fomites is also possible. The route of transmission is mainly respiratory tract.
c.	Chicken Pox	Varicella zoster virus	It is spread by the droplets from the upper respiratory tract of the infected person. Sometimes it is spread by the discharge from the ruptured lesions on the skin.
d.	Gonorrhoea	Niesseria gonorrhea	It is transmitted through sexual intercourse with an infected partner
e.	Hepatitis A	Hepatitis A virus (HAV)	<ul style="list-style-type: none"> Faeco-oral route is the major route of transmission, Contaminated food, water, milk.
f.	Typhoid Fever	Salmonella typhi bacilli	<ul style="list-style-type: none"> Transmitted by faeco-oral route. Contaminated food, water, milk. Flies

g.	Malaria	<p>1. Plasmodium vivax,</p> <p>2. P. falciparum,</p> <p>3.P. malariae,</p> <p>4. P. ovale.</p>	<ul style="list-style-type: none"> • Vector transmission: By the bite of certain species of infected female anopheline mosquitoes • Direct transmission: by infected needles, blood transfusion
h.	Cholera	Vibrio cholerae	<ul style="list-style-type: none"> • Spread is mainly by contaminated food, water, milk. Human being is the only reservoir of cholera infection. • Immediate source of infection is the stools and vomitus of cases and carriers.
i.	Hookworm infection	<p>Ancylostoma duodenale</p> <p>or</p> <p>Necator americanus..</p>	<ul style="list-style-type: none"> • When a person walks bare foot on the contaminated soil, the infective larvae penetrate the skin and the body of a healthy person. From skin it enters the blood stream and then into the lungs. From lungs it ascends to trachea and then pharynx. • From pharynx they are swallowed and get entry into the stomach and finally reach the small intestine. Here these larvae



			<p>develop into sexually mature form and start laying eggs in about six weeks which appear in faeces. The adult worms attach themselves to the mucus membrane of the intestine.</p>
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