



SUMMER – 13 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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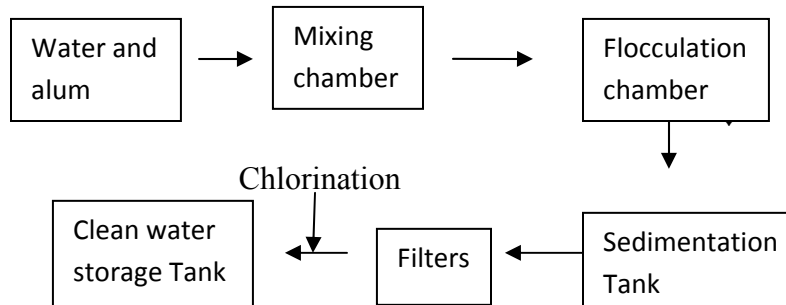
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Q1 Attempt any Eight of the following: **(2 marks for each question)**

8x2 = 16

a) Diagram of “Rapid Sand Filtration”



Flow diagram of rapid sand filtration plant

b) Define any 2: **One mark each definition.**

i) Entomology: It is the study of insects

ii) Essential amino acids: These are the amino acids which cannot be synthesized by the body and need to be obtained from the diet.

iii) Epidemiology: It is the study of distribution and determinants of the disease and health related events in the population and also the application of this knowledge to control health related problems.

c) Name vitamins given: **(0.5 marks each)**

i) Bleeding disorder: Vitamin K Or Vitamin C

ii) Beri beri: Vitamin B1 (Thiamin)

iii) Keratomalacia: Vitamin A

iv) Megaloblastic anaemia: Vitamin B12 (Cynocobalamin) or Folic Acid

d) What do you know about following **(One mark each)**

i) Reservoir: is a person, animal, plant or soil in which the infectious agent is present and is transmitted to a susceptible host. Reservoir does not develop the disease.

ii) Antibody: It is the substance formed in the body in response to stimulation by antigens.



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e) Compare the Benign Tumor and Malignant Tumor **0.5 marks for each point**

Benign Cancer	Malignant Cancer
Harmless	Harmful, could be life threatening
Grow slowly	Grow rapidly
encapsulated	Not Encapsulated
Metastasis does not occur	Metastasis can occur (abnormal cells leave site of origin and invade distant tissues)

f) Any two. **One mark each**

i) IUD: Intrauterine Device

ii)BCG: Bacillus Calmette Guerin

iii)STD: Sexually Transmitted Disease

iv) ORS: Oral Rehydration Salt/Solution

g) Define any two (**one mark each**)

i)Immunity: It is the body's ability to fight with the invading pathogens

ii)Infection: It is the entry and development or multiplication of any infectious agent in the body

Epidemic: It is the occurrence of the disease in excess of "expected occurrence"

OR

It is the infectious diseases which spreads rapidly in the community and affects large number of people in short time in given area.



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h) Important elements (0.5 marks each)

- i)Haemoglobin: Iron
- ii)Enlargement of Thyroid: Iodine
- iii)Contraction of Muscle: Calcium or Sodium
- iv)Development of bone: Calcium or Phosphorus

i) Explain any one (2 marks)

i)Mortality: Mortality means death. Population depends on the birth rate and death rate. Death rates are measured based on various criteria. It is indirect measure of health. Example: Crude Death Rate: It is the number of deaths per 1000 population per year in a given community.

ii)Balanced Diet : Malnutrition can be prevented by balanced diet. It is defined as “Food which contains adequate amounts of all nutrients namely: carbohydrates, proteins, fats, minerals, vitamins and which provide enough energy and maintain good health.

Balanced diet should contain cereals, pulses, vegetables, milk products, fruits, fish and meat in adequate amount.

j) Causative agent (0.5 marks each)

- i)Measles: Rubeola virus (RNA virus)
- ii)Plague: Yersinia pestis
- iii)Rabies: Lyssa virus type 1
- iv)Typhoid: Salmonella typhi

k) Explain the term (one mark each)

i) Health: It is the state of physical, mental, social well being and not only an absence of disease.

ii) Incubation period: It is the time period between an entry of the infectious agent and the appearance of the symptoms.



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l) Any two fungal infections (**one mark for each correctly written infection**)

Students may write actual examples of infections such as Candidiasis, Athletes foot, Dermatophytosis
,Blastomycosis etc

OR,

Fungal infections in general are called as Mycosis

- i) Superficial fungal infections
- ii) Deep seated fungal infections (Systemic infections)
- iii) Opportunistic infections

Q. 2 Attempt any four of the following : (**3 marks each**)

a) What is fracture? (One mark) Describe “first Aid for Fracture” (**2 marks**)

What is fracture: (**1 mark**)

A break or a crack in a bone is known as fracture. Usually pain, swelling, inability to move the affected body parts are some of the important symptoms.

First-aid (2 marks)

Depends on type & location of fracture. General treatment is as follows.

- Reassure and calm the person
- Check the breathing
- Control bleeding if any by applying pressure bandage
- Examine for other injuries, cover wounds with sterile dressing
- Immobilize the fractured part immediately by using bandages or splint or any similar material available at the spot)



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b) What is sewage ? **(1.5 marks)** What are aims of sewage treatment ? **(1.5 marks)**

Sewage is waste water and it contains waste water from public places, excreta, industrial waste .

It s dirty water with bad smell. It is usually water contacting 0.1% solids. It contains organic and inorganic substances, microbes ,dust ,fibers etc

Sewage if not treated ,then can cause major public health problems by contamination of water, soil etc.

Aims of Sewage treatment:

i)To decrease contents of pathogenic microorganisms and make it harmless

ii)Decrease organic material and convert it to simple organic substances which do not decompose further

Thus the sewage is made harmless by special treatment

c) Explain Gram staining Technique. (3 marks)

The Gram stain is commonly used differential staining technique for bacteria. **(0.5 mark)**

Technique:

Transfer a loopful of the liquid culture to the surface of a clean glass slide, and spread over a small area and form a film. Allow the film to air dry. Fix the dried film by passing it briefly through the Bunsen flame two or three times without exposing the dried film directly to the flame. The slide should not be so hot as to be uncomfortable to the touch. **(0.5 mark)**

Steps (2 marks)

i)Flood the slide with crystal violet solution for up to one minute. Wash off briefly with tap water (not over 5 seconds). Drain.

ii)Flood slide with Gram's Iodine solution, and allow to act for about one minute. Wash off with tap water. Drain.



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iii) Remove excess water from slide and blot, so that alcohol used for decolorization is not diluted. Flood slide with 95% alcohol for 10 seconds and wash off with tap water. Drain the slide.

iv) Counter stain with safranin solution for 30 seconds. Wash off with tap water. Drain and blot dry

lens. v) All slides of bacteria must be examined under the oil immersion

d) What are nosocomial infections? (1.5 marks) Describe prevention and control of it. (1.5 marks)

Nosocomial Infections :(**1.5 marks**)

Hospital acquired or nosocomial infections are the infections acquired by the patients after they have been admitted to the hospital and prior to the hospital admission, the patient do not have the said infection. Common nosocomial infections include infections of urinary tract, respiratory tract, alimentary tracts, wound infections, skin infection, septicemia etc

Control and Prevention: (**1.5 marks**)

To achieve this, a committee needs to be appointed in the hospital and they need to monitor following aspects on regular basis

i) Cleanliness in the hospital

ii) Proper sterilization of instruments and maintaining aseptic conditions wherever required

iii) Controlling overuse of antibiotics

iv) Maintaining Health and hygiene of hospital staff

v) Avoiding water , food contamination

vi) Proper isolation of infectious patients



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e) What are Effects of Air pollution on health? Name two methods of controlling.

Effects of air pollution :(**2 marks**)

Air pollution causes several effects on health and it has contributed to increase in morbidity and mortality. Respiratory tract disorders are common such as asthma, bronchitis and lung cancer. Air pollution also affects respiratory system of animals. It also causes retardation of growth in plants, spotting, burning of leaves etc.

Methods to control pollution (**any 2, 0.5 mark each**)

i) Containment (Stopping release of pollutants by using enclosures, air cleaning etc)

ii) Replacement (using energy resources which will not cause pollution: eg using natural gas, electricity)

iii) Dilution (plantation)

iv) Legislation (laws and rules like PUC, Smoke Nuisance act etc)

f) What are proteins? Explain functions and deficiency diseases of proteins.

(0.5 mark for definition)

Proteins are the complex organic compounds with C, H, O, N and occasionally also contain iron, phosphorous, sulphur and other elements

Human body contains 17% of proteins. Smaller units of proteins are amino acids, essential and non-essential.

Functions: (**1mark**)

- 1) Body building, repair and maintenance of tissues
- 2) For formation of antibodies, plasma proteins, haemoglobin, enzymes and hormones
- 3) For production of heat and energy

Deficiency Diseases (**1.5 marks**)

Protein deficiency is a common health problem in India. It is more common in children due to inadequate diet and infections.



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Two forms:

Kwashiorkor: Signs and symptoms: Edema , mental changes, poor appetite, diarrhoea, diffuse depigmentation of skin and hairs, enlargement of liver ,muscle wasting, growth retardation

Marasmus: severe muscle wasting, severe growth retardation, marked wasting of skin and bones, diarrhoea, and modified hair texture

Treatment: Adequate diet, treating infections and by promoting health education

Q 3 Attempt any four of the following. (Each Question carries 3 marks)

a) Describe emergency treatment of Burns. (3 marks)

- 1) Cool the burnt or scalded area immediately by putting plenty of cold water or by putting clean cloth soaked in cold water. Cooling of the part prevents further damage by removing residual heat from the affected area.
- 2) Remove the clothing of the patient by cutting it around.
- 3) Keep the patient in lie down position.
- 4) Reassure the patient and do not disturb the blisters.
- 5) Cover the burnt area by large dressings or by a clean cloth.
- 6) No antiseptic lotion, oil, flour, butter, baking soda or ink should be applied on the burn. Burn area should not be touched unless it is necessary.
- 7) Remove immediately from the body things like rings, bangles, belt, boots etc. because when the limbs swell due to edema, such articles may cause gangrene.
- 8) If the patient is conscious, give sips of water to him.
- 9) In case of chemical burns, wash the affected area with plenty of water until all chemical has been washed away.
- 10) If burns affect eyes, wash them thoroughly and afterwards cover with sterile dressings.
- 11) In case of extensive burn, wrap the victim in a clean cloth and shift him/her immediately to the hospital.
- 12) In case of delay in shifting the patient to a hospital start I.V. saline drip or preferably Ringer Lactate solution in order to prevent the patient from shock. A suitable analgesic can also be given by I.V route.



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b) Describe causes and control of diabetes. (1/2 marks each for causes and control)

Causes:

- 1) Pancreatic disease: defect in the synthesis of insulin or decrease in the number of beta cells.
- 2) Heredity
- 3) Sedentary life style: Lack of exercise.
- 4) Diet: Rich in carbohydrate and fats
- 5) Obesity
- 6) Viral infections: This may lead to beta cells destruction.
- 7) Stress

Control:

Though diabetes cannot be cured it can be effectively controlled by adopting following measures:

- 1) Maintenance of normal body weight by exercise and dietary control.
- 2) Regular checkup of urine sugar and blood sugar should be done.
- 3) Personal hygiene including care of feet and skin should be taken care of.
- 4) Treatment with insulin and oral anti diabetic agents like Tolbutamide, Glipizide, Glibenclamide etc.
- 5) Since NIDDM appears to be linked with sedentary life style, over nutrition, obesity, correction of these may reduce the risk of diabetes and its complications.
- 6) Alcohol should be avoided, as it indirectly increases the risk of diabetes.
- 7) Subjects at risk should avoid diabetogenic drugs like oral contraceptives.

c) Define and explain Demographic Cycle. (Definition carries 1 mark and cycle 2 marks)

Demography is a scientific study of human population.

Demographic Cycle:

- 1) There are five stages of Demographic Cycle through which a nation passes.
- 2) First stage (high stationary stage): It is characterized by high birth rate and high death rate which cancel each other. So the population remains stationary. India was in this stage till 1920.
- 3) Second stage (Early expanding stage): There is decline in death rate while birth rate remains unchanged. So the population expands. Many developing countries of Asia and Africa are in this stage.
- 4) Third stage (Late expanding stage): Death rate declines further and birth rate begins to fall. Yet there is increase in population since birth rate exceeds deaths. India appears to have entered this stage.



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5) Fourth stage (Low stationary stage): Low birth rate and low death rate so the population becomes stationary.

6) Fifth stage (Declining stage): Population begins to decline as birth rate is lower than death rate.

d) Name four dimensions of health and describe physical dimension.

Naming carries 1 mark (1/4 for each name) and description 2 marks.

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

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
- 7) All special senses are intact
- 8) The resting pulse rate, blood pressure, and exercise tolerance are at normal range for the individuals age and sex

e) What are Zoonotic diseases? Give examples and controlling measures.

(Definition 1Mark, examples (minimum 2) 1 Mark and controlling measures 1Mark)

Zoonotic diseases are those disease and infections which are naturally transmitted between man and animal.



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Examples :-

- 1) Rabies: dog fox jackal
- 2) Anthrax: herbivorous animals, pigs
- 3) Brucellosis: cattle, sheep, goat, pig, dog
- 4) Leptospirosis: rodents, domestic and wild mammals
- 5) Plague: rodents
- 6) Salmonellosis: mammals and birds
- 7) Tuberculosis: cattle, sheep, goat, pig, dog
- 8) Taeniasis: cattle
- 9) Cysticercosis: swine
- 10) Leishmaniasis: dogs and rodents
- 11) Toxoplasmosis: cats, mammals, birds

Controlling measures:

- 1) Breeding the animals in clean cages and sheds
- 2) Proper disposal of human excreta
- 3) Drinking milk after boiling to avoid tuberculosis
- 4) Proper cooking of beef to avoid worm infection
- 5) Immunization of animals against rabies
- 6) Micro-organisms are killed by insecticide.

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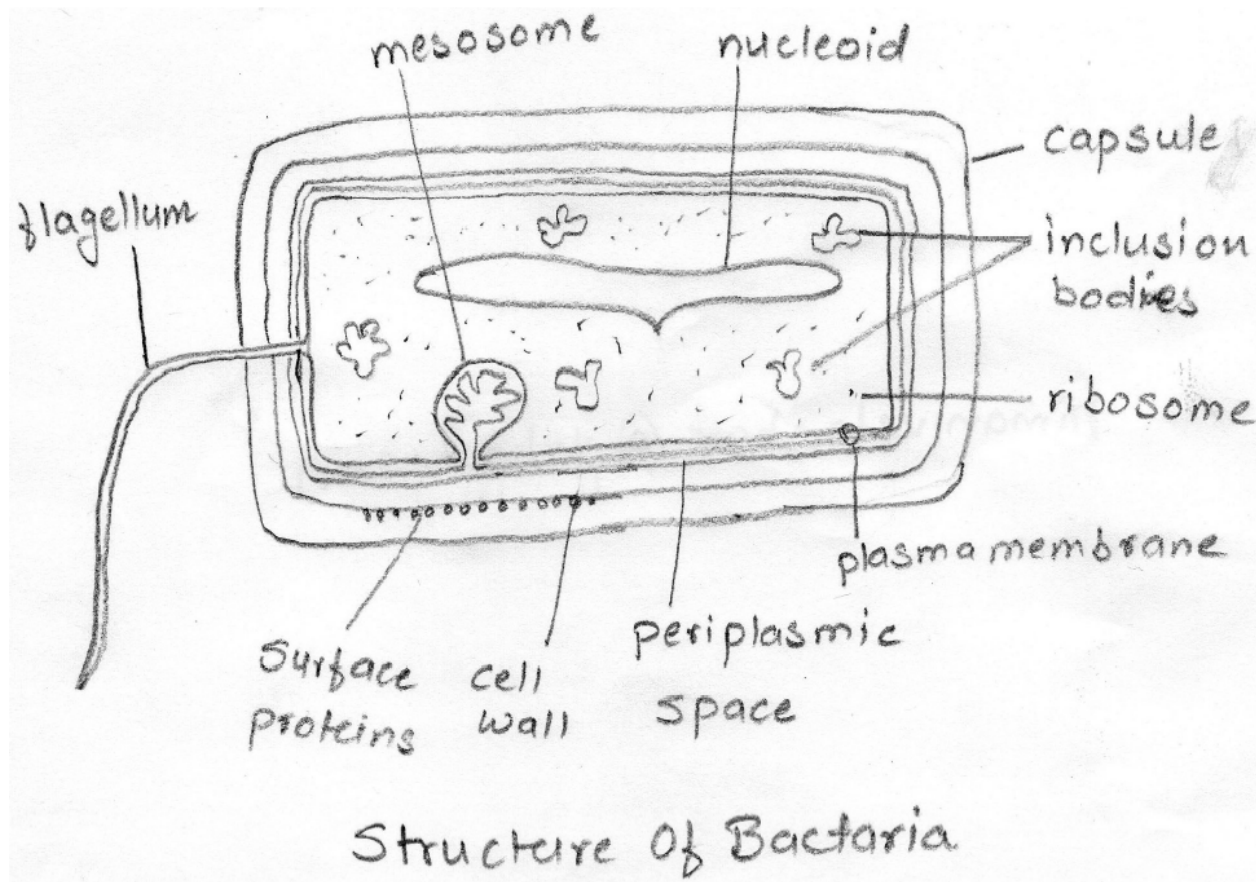
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f) Describe the structure of a bacterial cell with a well labeled diagram.

(Description carries 1.5Mark and diagram carries 1.5Mark)



Structure of bacterial cell:

1) Capsule: Cell surrounded by gelatinous or slimy material forming a protective covering layer or envelop. It consists of polysaccharide or polypeptide. It protects the organism against environmental changes.

2) Cell wall: It is a rigid structure that renders the cell capable of survival even when there are great differences of osmotic pressure between cell and environment. It is made up of protein and polypeptide with mucin, polysaccharide or phospholipids components. It encloses cytoplasm and cytoplasmic membrane. It gives shape to the cell.

3) Cytoplasmic membrane: It is a semi permeable membrane beneath the cell wall. It is composed of phospholipids and proteins. It controls the passage of nutrients and waste products into and out of the cell.



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4) Nucleus: Nucleus is not well defined but nuclear material is present near the Centre of the cell. The total nuclear material called nucleoid, consist if a single circular chromosome and it contains genetic material such as RNA and DNA

5) Cytoplasm: It consists of about 80% water along with nucleic acids, proteins carbohydrates, lipids, inorganic ions, many low molecular weight compounds and particles with various functions.

6) Ribosomes: Ribosomes are present in cytoplasm and are sites of protein synthesis.

7) Flagella: Thin hair like filament that extends from cytoplasmic membrane and through the cell wall. It is an organ of locomotion.

Q 4. Attempt any four of the following.(Each Question carries 3 marks)

a) Classify contraceptives with examples.

Contraceptive methods are broadly classified into Temporary methods and Permanent methods

Temporary methods:

1) Barrier methods:

- i) Physical methods e.g. condom, diaphragm, vaginal sponge
- ii) Chemical methods: e.g. foam tablets, creams, suppositories, soluble films

2) Intra-uterine devices(IUDs):

- i) First generation IUDs : Lippe's loop
- ii) Second generation IUDs: copper T, copper 7, Nova-T, multiload devices
- iii) Third generation IUDs : Progestasert

3) Hormonal methods:

- i) Oral pills: combined pills, progestogen only pill, post-coital pill, once a month pill, male pill
- ii) Slow release preparations(depot formulations): injectable, subdermal implants, vaginal rings

4) Miscellaneous methods:

- i) Behavioral method: abstinence, safe period (rhythm method), coitus interrupts
- ii) Natural family planning methods: basal body temperature, cervical mucus method, symptothermic method
- iii) Breast feeding



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Permanent methods (Terminal methods):

- i) Male sterilization (vasectomy)
- ii) Female sterilization (tubectomy)

b) What are carbohydrates? Give sources with examples.

(Definition carries 1Mark and sources carry 2Marks)

Carbohydrates are chemically composed of carbon, hydrogen, and oxygen. It is the main source of energy.

Sources: There are three main sources of energy:

1) Sugars: it is the simplest form of carbohydrates. e.g.

Monosaccharide: glucose, fructose, galactose.

Disaccharides: sucrose, lactose, maltose

2) Starch: it is a polysaccharide and important constituent of our diet. It is found in cereals, roots and tubers.

3) Cellulose: it is an indigestible component of carbohydrate with no nutritive value but constitutes dietary fiber or roughage, which help in bowel movement. It is found in vegetables, fruits, grains.

C) Explain sources of water. 3marks

1. Rain water

2. Surface water

3. Ground water

Rain water:

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:

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.



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a) 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.

b) **Ground water**:

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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d) Give the sources and deficiency diseases of vitamin B.

1.5 marks for source and 1.5 marks for deficiency diseases.

vitamin	Sources	Deficiency diseases
B1 (Thiamine)	Yeast, liver, peas pulses, nuts, rice, egg and fruits.	Beriberi, general fatigue and loss of muscle tone.
B2 (Riboflavin)	Egg, liver, milk, kidney, fish, green leafy vegetables, meat.	Dermatitis, angular stomatitis, eye less ions, delayed wound healing. Impaired neuromotor function. Increase chances of cataract.
B3 (Niacin)	Yeast, fish, pulses, cereals.	Pellagra, dermatitis, dementia, diarrhoea, tongue inflammation.
B6 (Pyridoxine)	Milk, liver, meat, egg yolk, fish, green vegetables,	Retarded growth, loss body weight, anaemia
B7 (biotin)	Pulses, nuts, yeast, liver kidney.	Dermatitis, muscular pain, anaemia, conjunctivitis
B12 (cyanocobalamine)	Meat, liver, kidney, egg, milk, green vegetables, fermenting liquor.	Megaloblastic anemia, pernicious anemia



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e) **Enlist health indicators and explain any two? (1 mark for enlisting and 1 mark each for explanation)**

1. **Mortality indicator:** The important mortality indicators are as follows.

- **Crude death rate:** It is defined as number of deaths per 1000 population per year in a given community.
- **Life expectancy:** life expectancy at birth is defined as average no. of years that will be lived by those born alive in to population.
- **Infant mortality indicator:** it is the ratio of deaths under one year of age in a given year to the total no. of birth in the same year, usually expressed as rather per 1000 live birth.
- **Child mortality rate:** no. of deaths at age 1 to 4 years in a given year per 1000 children in that age group at the midpoint of the year concern.
- **Maternal mortality rate:** it indicates proportion of deaths among women of reproductive age.
- **Disease specific mortality:** these are the rates due to specific diseases. For e.g. mortality rate due to cancer, cardiovascular diseases etc.

2. **Morbidity indicator:**

The description of the mortality rate do not reveal the burden of ill health in a community, so the morbidity (proportion of disease to health in a community) indicators are used to supplement mortality data to describe health status of population.

3. **Disability rate:**

Since the death rate have not changed markedly in recent years. Despite massive health expenditures, disability rates related to illness and injury have come in to use to supplement mortality and morbidity indicators.

4. **Nutritional status indicator:**

These are measurement of height, weight and circumference of pre-school children at school entrance age.

5. **Health care delivery indicator:**

These indicators reflect the equity of distribution of health resources in different parts of the country and provision of healthcare

- a. Doctor: Population ratio
- b. Doctor: Nurse ratio
- c. Population: Hospital bed ratio



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6. Environmental indicator:

These reflect the quality of physical and biological environment in which diseases occurs and in which people live. It includes indicator related to pollution of air and water, radiations, solid waste, noise, exposure to toxic substances in food and drink etc.

7. Socio-economic indicator:

It is indirect measure of health status. It includes

- Rate of increase in population
- Level of unemployment
- Family size
- Literacy rate
- Dependency ratio

8. Utilization rates:

It indicates the extent to which healthcare facilities are utilized by the population in year

- Percentage of immunized childrens and mothers
- Bed occupancy rate
- Length of hospital stay
- Percent of people using family planning methods

9. Social and mental health indicators:

it includes the incidents of suicides, homicides, alcohol or drug abuse, smoking, road traffic accidents, use of tranquilizer etc. these indicators provide guide to social action for improving health of people.

f) Explain Cardio pulmonary Resuscitation. 3 marks

It is life saving first aid procedure used when patients's pulse or breathing stops. Resuscitation is the process of maintaining exchange of gasses in the lungs through artificial respiration and survives the heart activity.



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CPR consists of artificial respiration and artificial circulation. It can be performed as follows

1. **Clearance of airways:**

First of all air passage should be opened and cleaned to make free passage of air. For this wrap a handkerchief of clean cloth on first two fingers of hand together and clean victims mouth carefully by turning the mouth of the patient to one side.

2. **Artificial breathing:**

Without oxygen a person cannot survive for more than 3 mins. So when breathing has stopped after cleaning the airway immediately artificial respiration should be given.

There are different methods of artificial respiration:

- a. Mouth to mouth respiration
- b. Mouth o nose respiration
- c. Arm lift back pressure technique (Holger Nielsen method)
- d. Arm lift chest pressure technique (Silvester method)

3. **Cardiac massage:**

When the pulse of the patient is not felt, that means the heart is not functioning and because of that blood cannot circulate. In such situation immediately cardiac massage is performed.

Cardiac massage is performed by pressing hard with both hands on the patient's chest, two fingers above the lower end of sternum. On this area put your left hand and start pressing with the force of both the hands one above the another. Press at correct position with the heel of the hand only. While performing cardiac massage arms should always be perpendicular to areas of compression. After pressing release the force at once but do not remove the hands from the position. Repeat this about 60-70 times per minute for an adult.

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Q.5 Answer any Four.

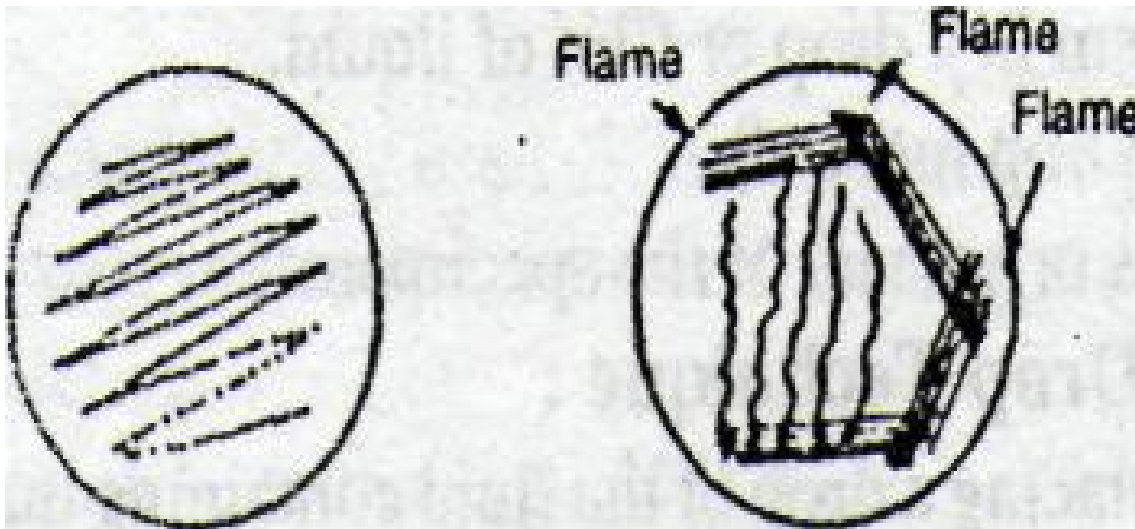
3 marks for each question.

a) Isolation of pure Culture: (Each method for 1 mark)

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 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.





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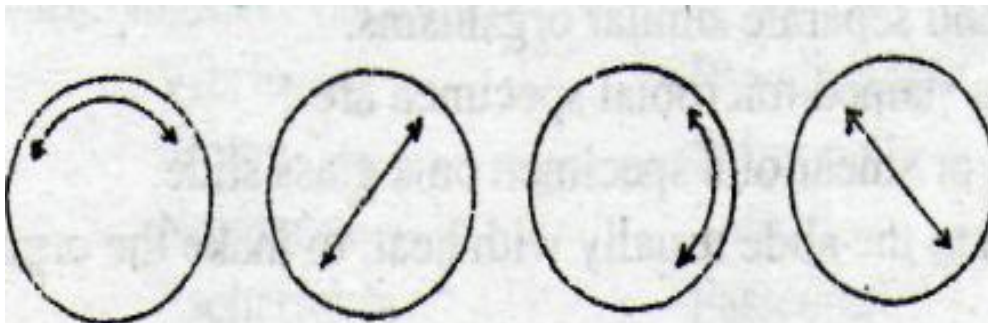
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ii) Spread Plates Method

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.



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

b) Natural History Of Disease

The term natural history of disease is a key concept of epidemiology. By studying the health history of the population and their disease trends, one can postulate etiological hypothesis about disease causation. (1 mark)

The natural history of disease is usually described in two phases.

1 – Prepathogenesis

2 – Pathogenesis phase



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Prepathogenesis: (1 mark)

This refers to the period before the onset of the disease in man. The causative agent has not yet entered the host (man) , but the factors which favour the interaction with the human host are already existing in the environment. So potentially all of us are in the prepathogenesis phase of many communicable and non communicable diseases.

Pathogenesis phase: (1 mark):

It begins with the entry of the disease causing agent in the susceptible human host. This initiates cycle of events like incubation of the causative microbe for a specific period of time in the host , its multiplication and subsequent tissue and physiological changes.

The pathogenesis phase can be modified by chemotherapy and immunization. At this stage the host's reaction to the infection is unpredictable. Host may develop clinical symptoms or may act as a carrier with or without development of the clinical disease

c) Advantages and disadvantages of light:

Advantages of light: (2 marks)

1. Light helps for effective vision.
2. Light causes many rhythmic changes in biological functions. Physical activity, sleep, food consumption, water intake, body temperature, melanin synthesis and the rates at which glands secrete hormone, all vary with duration of light availability that approximates 24 hrs.
3. Phototherapy i.e. exposure to light has a direct beneficial effect on the liver for controlling the hyperbilirubinemia in premature infants.
4. Light acts on the skin to synthesize Vit.D which is essential for proper metabolism of calcium.

Disadvantages of light :(1 mark)

1. Inadequate light puts strain on the visual apparatus which leads to general fatigue and loss of efficiency.
2. Exposure to natural sunlight over a long period can cause skin cancer. And in some individuals can cause sunburn or inflammation of skin.



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d) National immunization schedule:

Immunization is a mass means of protecting large number of population. . Each country has its own immunization schedule based on their local needs. The Indian version of National Immunization Schedule to protect the children against six vaccine-preventable diseases -Diphtheria, Whooping Cough, Tetanus, Polio, Tuberculosis, Measles is as mentioned below.

Beneficiaries	Age	Vaccine	No.of doses and route of administration.
Infants	6 weeks to	DPT	3 intramuscular
	9 months	Polio (OPV) BCG	3 oral 1 intradermal
Children	9 to 12 months	Measles	subcutaneous
	16 to 24 months	DPT (I booster) Polio (I booster)	1 intramuscular 1 oral
	5-6 years	DT (II booster) Typhoid	1 intramuscular, (Two doses if not immunized previously) 2 subcutaneous.
	10 years	Tetanus toxoid Typhoid	1 intramuscular 1 subcutaneous
	16 years	Tetanus toxoid Typhoid	1 Intramuscular 1 subcutaneous.
Pregnant women	16 to 36 weeks of pregnancy	Tetanus toxoid	2 intramuscular.



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e) Prevention and treatment of Hypertention:

Hypertension means high blood pressure. The normal blood pressure of an adult is 120/80 mm Hg- systolic /diastolic. The systolic blood pressure higher than 160mm Hg and /or diastolic blood pressure greater than 95 mm Hg is said to be hypertension.

Prevention of Hypertension (2 marks)

1. Reduction in consumption of salt, saturated fats in the diet.
2. Reduction of weight and taking regular exercise.
3. Avoid smoking and alcohol.
4. Avoid stress and strain in life. Meditate and perform yoga.

Treatment of Hypertension (1 marks)

Detected cases of hypertension can be treated as follows:

1. Antihepertensive drugs such as Diuretics and Beta blockers etc..
2. It also includes diet control and exercise.

f) Role of Pharmacist

HealthPromotion, Disease prevention-a joint effort of medical, paramedical and non medical fraternity. Pharmacist is also one of the important health professionals.

(1st point of below mentioned points is compulsory, any two of the remaining four points i.e 2-5 can be considered).Each point carries 1 mark.

1. The pharmacist should not only sell medicines but should also explain its effects, side effects, drug interactions,dose to be taken by the patient, correct way of swallowing the tablet, right time for taking the medicine, the kind of food to be taken during the particular treatment and the ill-effects of the expired medicines.



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2. Pharmacist can play a role in the control and prevention of communicable disease like tuberculosis, sexually transmitted disease (STD), AIDS.
3. He can direct the patient to proper medical care facilities and can get involved in public education. In the control of chronic disease like hypertension, asthma, the community pharmacist can encourage the people to acquire good living habits like quitting smoking, alcoholism to increase the consumption of nutritious and low cholesterol diet, to increase physical activity. in such aspects.
4. In the control of chronic disease like hypertension, asthma, the community pharmacist can encourage the people to acquire good living habits like quitting smoking, alcoholism to increase the consumption of nutritious and low cholesterol diet, to increase physical activity.
5. The pharmacist can participate in community health education by providing the information about maternal and child healthcare, family planning, immunization, nutrition, environmental health, drug abuse, alcoholism



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Q.6) Answer any four (4 marks for each question).

Tabulated form of disease with Causative Agent , Mode of Transmission,Prevention & Control

Sr. No.	Diseases	Causative Agent (1/2 marks)	Mode of Transmission (1 ½ marks)	Prevention and Control (2marks)
a)	Polio	A poliovirus which has three serotypes 1, 2 and 3.	<ul style="list-style-type: none">• Faeco-oral route is the main route of transmission of the disease.• Man is the reservoir of the virus.• Another route is the droplet infection, this occurs in the acute phase of disease when the virus occurs in the throat. Close personal contact with an infected person facilitates droplet infection.	<ul style="list-style-type: none">• Notification of the case to the health authorities.• Proper disposal of urine and faeces.• Protection of water sources and supply of safe drinking water.• Personal hygiene should be strictly maintained.• Poliovirus vaccine live oral (Trivalent oral polio vaccine, Sabine vaccine) is the vaccine of choice for primary immunization of children. It is indicated for active immunization against infections of poliovirus caused by type 1, 2 and 3 in infants starting at 6-12 week.



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b)	Leprosy	Mycobacterium leprae	Leprosy may be transmitted by droplet infection, direct or indirect contact of an infected patient. It may be transmitted through breast milk of lepromatous mother, by insect vectors or by tattooing needles	<ul style="list-style-type: none">• Detection of the cases.• Multidrug therapy for control and cure.• Surveiiiance• Immunoprophylaxis• Chemoprophylaxis and rehabilitation of patients• To interrupt the transmission of the disease.• Treat the patient for complete cure and rehabilitation.
c)	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.	<ul style="list-style-type: none">• Early detection of suspected cases and bacteriological examination of stools for confirmation. Cholera cases should be notified to local health authority.• Patient's stools, vomitus should be collected in a pot containing disinfectant.• Water and milk should be consumed only after boiling.• Fruits, vegetables should be thoroughly cleaned before use



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d)	Trachoma	Chlamydia trachomatis	It occurs by direct or indirect contact with ocular discharges of infected person or fomites. Swimming pool where water can get contaminated is also a source of infection. Overcrowding also helps in transmission.	<ul style="list-style-type: none">• Early diagnosis and treatment of cases.• Common use of eye cosmetics like kajal, surma should be avoided.• Health education and community hygiene plays an important role in prevention and control of trachoma
e)	AIDS	Human Immunodeficiency Virus (HIV)	<ul style="list-style-type: none">• HIV is transmitted from person to person by Sexual contact: Any vaginal, oral or anal sex with infected partner can spread AIDS, as the virus is present in the vaginal secretions, semen.• Transfusion of the infected blood or through contaminated needles and syringes.• The virus can be transmitted from the infected mother to foetus through placenta.	<ul style="list-style-type: none">• Screening of blood donors for AIDS.• Screening of high risk groups like drug addicts and prostitutes.• Avoid indulgence in multiple sexual partners, avoid oral, anal sex.• Use of contraceptive devices like condom.• Use of disposable syringes and needles.



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f)	TB	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	<ul style="list-style-type: none">• One should live in properly ventilated house.• Nourishing and well balanced diet should be taken.• Milk should be consumed after proper, boiling.• Tuberculosis patient should be detected as early as possible by microscopic examination of sputum, chest x-ray and tuberculin test.• Infected persons should be isolated.• Detected patients should be promptly treated with specific tuberculosis drugs.• Patients should be advised to spit only in sputum cup containing disinfectant,• While coughing he should use handkerchief, which should be properly disinfected after use.• B .C.G, vaccination (Bacillus Calmette Guerin) should be given to newborns below four weeks of
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			<ul style="list-style-type: none">• It is also tolerant to the acid environment of the stomach and And it has been isolated from the gastric contents of the patients suffering from tuberculosis.	<p>age.</p> <ul style="list-style-type: none">• Vaccination can be done to individuals below 20 years of age.• People should be taught that tuberculosis is not an incurable disease. They should be advised that taking the antituberculosis drugs in sufficient doses and for a sufficient period of time is very essential for the complete cure of the disease.
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