लोक सेवा आयोग

बागमती प्रदेश

प्रदेश निजामती सेवा तथा स्थानीय सरकार सेवाका प्रशासकीय तर्फका स्वास्थ्य सेवा, सहायकस्तर हेल्थ इंस्पेकसन समूह सहायकस्तर पाचौं तह लागि लिएको खुला प्रतिस्पर्धात्मक लिखित परीक्षा

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पत्रः द्वितीय **समयः** २ घण्टा १५ मिनेट

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सबै प्रश्न अनिवार्य छन्। प्रश्नहरुको उत्तर खण्ड (Section) अनुसार क्रमसङ्ख्यामा उल्लेखबमोजिम क्रमबद्ध रुपमा लेख्नुहोस्। परीक्षामा मोबाइल लगायतका विद्युतीय उपकरणहरुको प्रयोग गर्नु पाईँदैन।

Section A

1. Mention the vision, mission, goal and objectives of national immunization program. [10]

The National Immunization Program (NIP) of Nepal is a cornerstone of public health, aiming to protect children and communities from vaccine-preventable diseases (VPDs).

- **Vision:**
  - A Nepal where all individuals, especially children and women of childbearing age, are protected from vaccine-preventable diseases, contributing to a healthy and productive nation with reduced child and maternal mortality and morbidity.
- **Mission:**
  - To ensure equitable access to high-quality, safe, and effective immunization services for all eligible populations across Nepal, through a robust, sustainable, and community-engaged health system, thereby achieving and maintaining high immunization coverage.
- **Goal:**
  - To reduce mortality, morbidity, and disability associated with vaccine-preventable diseases to a level where they are no longer of public health significance. This includes aims like polio eradication, measles elimination, and control of other VPDs.
- **Objectives:**
  1. **High Coverage:** To achieve and sustain at least 95% immunization coverage for all antigens included in the national schedule at national, provincial, district, and local levels.
  2. **Equity:** To ensure that all children, regardless of their socio-economic status, geographic location, or ethnicity, have access to and complete their immunization schedule.
  3. **New Vaccine Introduction:** To systematically assess and introduce new, cost-effective vaccines against diseases of public health importance as per global recommendations and national needs (e.g., PCV, Rota, HPV).

4. **Disease Surveillance:** To strengthen surveillance systems for VPDs to monitor disease trends, detect outbreaks promptly, and evaluate program impact.
5. **Vaccine Safety:** To ensure the safety of all immunization procedures and vaccines through effective adverse event following immunization (AEFI) monitoring and management.
6. **Cold Chain & Logistics:** To maintain an effective cold chain system and vaccine logistics management to ensure vaccine potency and availability at all service delivery points.
7. **Community Engagement & Demand Generation:** To increase awareness and demand for immunization services through effective communication strategies and community participation.
8. **Capacity Building:** To strengthen the capacity of healthcare workers at all levels for effective planning, implementation, monitoring, and evaluation of immunization services.
9. **Sustainability:** To ensure the long-term sustainability of the immunization program through adequate domestic financing and strong political commitment.

2. Define community diagnosis. List the steps of community health diagnosis. [1+5=6]

- **Definition of Community Diagnosis:**
  Community diagnosis is a comprehensive process of identifying and quantifying the health problems and needs of a defined community, along with their determinants. It involves collecting, analyzing, and interpreting data on the community's demographic profile, health status, socio-economic conditions, environmental factors, and available health resources. The purpose is to prioritize health issues and plan effective interventions to improve community health.
- **Steps of Community Health Diagnosis:**
  1. **Defining the Community:** Clearly delineate the geographic boundaries, population size, and characteristics of the community under study.
  2. **Planning and Preparation:**
     - Formulate objectives for the diagnosis.
     - Identify necessary resources (personnel, budget, time).
     - Develop data collection tools (questionnaires, checklists, interview guides).
     - Obtain necessary permissions and involve community leaders.
  3. **Data Collection:** Gather information from various sources:
     - **Primary data:** Surveys (household, individual), key informant interviews, focus group discussions, direct observations.
     - **Secondary data:** Health facility records, census data, vital statistics, reports from other sectors (e.g., education, agriculture).
       Data collected typically includes demographics, morbidity and mortality patterns, nutritional status, environmental sanitation, socio-economic factors, lifestyle factors, and health service utilization.
  4. **Data Analysis and Interpretation:**
     - Organize and summarize the collected data.
     - Calculate relevant health indicators (e.g., prevalence rates, incidence rates, infant mortality rate).
     - Identify patterns, trends, and disparities in health status.
     - Analyze the determinants of identified health problems (social, economic, environmental).

5. **Prioritization of Health Problems:**
    - Use criteria such as magnitude of the problem, severity, feasibility of intervention, community concern, and available resources to rank health problems.
    - Involve community members and stakeholders in the prioritization process.
6. **Developing an Action Plan and Dissemination:**
    - Based on prioritized problems, formulate specific, measurable, achievable, relevant, and time-bound (SMART) objectives and strategies for intervention.
    - Share the findings and action plan with the community, health authorities, and other relevant stakeholders to garner support and facilitate implementation.

3. Mention the current organizational structure of 15 bedded primary hospital. [5]

The organizational structure of a 15-bedded Primary Hospital (PH) in Nepal, typically under local government (Palika) management, aims to provide basic curative, preventive, and promotive health services. While specific staffing can vary slightly based on location and available resources, a general structure includes:

- **Hospital Management/Administration:**
    - **Medical Superintendent / Hospital In-Charge (MBBS Doctor):** Overall responsible for clinical services, administration, management, and coordination.
    - **Administrative Staff:** (May include an accountant, storekeeper, and support staff like office assistants, peons).
- **Clinical Services:**
    - **Medical Officers (MBBS):** One or more, providing general outpatient (OPD) and inpatient (IPD) care, emergency services, and minor surgical procedures.
    - **Dental Surgeon/Dental Hygienist (if available):** For dental services.
    - **Nursing Department:**
        - **Nursing Officer / Staff Nurses:** Responsible for ward management, patient care, medication administration, assisting doctors, and maintaining nursing records.
        - **Auxiliary Nurse Midwives (ANMs):** Assisting in wards, OPD, maternal and child health (MCH) services, immunizations, and family planning.
    - **Paramedical Staff:**
        - **Health Assistants (HAs) / Sr. AHWs:** Involved in OPD services, minor procedures, community outreach program supervision, reporting, and assisting medical officers.
        - **Lab Technicians:** Responsible for basic laboratory investigations (hematology, urinalysis, stool, sputum microscopy).
        - **Radiographer/Dark Room Assistant (if X-ray services are available):** For radiological investigations.
        - **Pharmacy Assistant/Dispenser:** Managing the pharmacy, dispensing medications, and maintaining drug inventory.
- **Support Services:**
    - **Cleaners/Sweepers:** For hospital hygiene and sanitation.
    - **Guards:** For security.

- **Driver (if an ambulance is available).**

Key Functional Units:

- Out-Patient Department (OPD)
- In-Patient Department (IPD - with 15 beds)
- Emergency Room
- Minor Operation Theatre (MOT)
- Laboratory
- Pharmacy
- Dressing Room
- MCH Clinic (including immunization and family planning)
- Administrative Office
- Store

This structure is designed to be functional and provide essential health care at the primary level, serving as a referral point for health posts and a link to higher-level hospitals.

4. Describe the roles and responsibilities of FCHVs. [5]

Female Community Health Volunteers (FCHVs) are the backbone of community-based primary healthcare in Nepal. They are selected by their communities and work voluntarily, though they receive some incentives and support.

Roles and Responsibilities of FCHVs:

1. **Maternal Health:**
   - Identify pregnant women and encourage antenatal check-ups (ANC).
   - Counsel pregnant women on nutrition, danger signs during pregnancy, and importance of institutional delivery.
   - Distribute iron and folic acid tablets.
   - Encourage postnatal check-ups (PNC) for mothers and newborns.
   - Promote family planning methods and distribute temporary contraceptives (e.g., condoms, pills).
2. **Child Health:**
   - Promote and support immunization activities, ensuring children complete their vaccination schedule.
   - Distribute Vitamin A capsules and deworming tablets during national campaigns.
   - Identify and refer children with malnutrition.
   - Promote exclusive breastfeeding for the first six months and appropriate complementary feeding.
   - Provide basic management for common childhood illnesses like diarrhea (distributing ORS and zinc) and pneumonia (identifying danger signs and referring).
3. **Health Promotion and Education:**
   - Conduct health education sessions in the community on topics like sanitation, hygiene, nutrition, family planning, and prevention of communicable diseases.

- Organize and participate in Mothers' Group meetings to disseminate health messages.
- Promote healthy behaviors and practices within households.

4. **Disease Prevention and Control:**
    - Assist in national health campaigns (e.g., polio, measles, vitamin A).
    - Identify and report cases of communicable diseases (e.g., tuberculosis, malaria, kala-azar) to the nearest health facility.
    - Promote environmental sanitation and hygiene practices.
5. **Community Mobilization and Linkage:**
    - Act as a bridge between the community and the formal health system.
    - Refer patients to health facilities for diagnosis and treatment.
    - Mobilize community members for health programs and initiatives.
    - Maintain records of their activities and report to the local health facility.
6. **Support during Outbreaks and Emergencies:**
    - Assist in surveillance and reporting during disease outbreaks.
    - Help disseminate information and provide support during health emergencies or natural disasters.

FCHVs play a crucial role in improving access to essential health services, particularly in remote and underserved areas, contributing significantly to Nepal's progress in public health indicators.

5. Explain the epidemiological determinants, diagnosis & management of cholera. [10]

Cholera is an acute diarrheal illness caused by infection of the intestine with the bacterium *Vibrio cholerae*. It can be rapidly fatal if left untreated due to severe dehydration.

Epidemiological Determinants:

These are the factors influencing the occurrence and distribution of cholera, often described using the epidemiological triad:

- **Agent:**
    - **Causative Organism:** *Vibrio cholerae*, specifically serogroups O1 (Classical and El Tor biotypes) and O139, which produce cholera toxin.
    - **Characteristics:** Gram-negative, motile, comma-shaped bacteria. Survives well in water, especially brackish water.
    - **Infective Dose:** High, but lower in individuals with reduced gastric acidity.
    - **Reservoir:** Humans (cases and carriers) and aquatic environments (e.g., copepods in contaminated water).
- **Host:**
    - **Age:** All ages are susceptible, but severe disease is more common in children and the elderly.
    - **Immunity:** Infection or vaccination provides some immunity, but it's not lifelong or fully protective against all strains.
    - **Nutritional Status:** Malnutrition can increase severity.

- **Gastric Acidity:** Reduced stomach acid (e.g., due to antacids, gastrectomy, or achlorhydria) increases susceptibility.
- **Blood Group:** Individuals with blood group O are reportedly more susceptible to severe cholera.
- **Socio-economic Status:** Poverty, lack of education, and poor living conditions are associated with higher risk.

- **Environment:**
  - **Water:** Contaminated water sources (unsafe drinking water, water used for cooking or washing) are the primary mode of transmission.
  - **Sanitation:** Poor sanitation, open defecation, and improper sewage disposal facilitate fecal-oral transmission.
  - **Food:** Contaminated food, especially raw or undercooked seafood, fruits, and vegetables washed with contaminated water.
  - **Hygiene:** Poor personal hygiene (e.g., not washing hands after defecation or before handling food).
  - **Climate:** Outbreaks are more common during rainy seasons (due to flooding and water source contamination) and in warm climates.
  - **Overcrowding:** Slums, refugee camps, and areas affected by natural disasters increase the risk of rapid spread.

Diagnosis:

- **Clinical Diagnosis:**
  - Based on characteristic symptoms, especially in an endemic area or during an outbreak.
  - Sudden onset of profuse, painless, watery diarrhea ("rice-water stool" – grayish, turbid, with flecks of mucus).
  - Vomiting may occur, often after the onset of diarrhea.
  - Rapid dehydration: sunken eyes, loss of skin turgor, dry mucous membranes, thirst, muscle cramps, weak pulse, low blood pressure, oliguria.
  - Absence of fever is typical.
- **Laboratory Diagnosis:**
  - **Microscopy:** Dark-field microscopy of a fresh stool sample can show characteristic darting motility of vibrios (presumptive).
  - **Stool Culture:** Definitive diagnosis. Stool is cultured on selective media like Thiosulfate Citrate Bile Salts Sucrose (TCBS) agar. *V. cholerae* produces yellow colonies on TCBS.
  - **Serotyping:** Isolates can be serotyped to identify O1 or O139 serogroups.
  - **Rapid Diagnostic Tests (RDTs):** Crystal VC dipstick test can provide a quick presumptive diagnosis in field settings, useful during outbreaks.

Management:

The cornerstone of cholera management is rapid and adequate rehydration.

1. **Rehydration Therapy:**

- **Oral Rehydration Salts (ORS):** For mild to moderate dehydration. WHO-recommended low-osmolarity ORS solution should be given frequently in small amounts.
- **Intravenous (IV) Fluids:** For severe dehydration or if the patient cannot take ORS (e.g., due to persistent vomiting or shock). Ringer's Lactate is the preferred IV fluid. Normal Saline can be used if Ringer's Lactate is unavailable, but may require potassium supplementation.
- **Assessment of Dehydration:** Crucial to determine the fluid replacement plan (Plan A: no dehydration, home care with ORS; Plan B: moderate dehydration, ORS at health facility; Plan C: severe dehydration, IV fluids immediately).

2. **Antibiotic Therapy:**
   - Reduces the duration and volume of diarrhea and shortens the period of vibrio excretion.
   - Recommended for moderately to severely ill patients.
   - Choice of antibiotic depends on local antimicrobial susceptibility patterns. Common options include:
     - Doxycycline (single dose for adults, not for young children or pregnant women)
     - Azithromycin (single dose, preferred for children and pregnant women)
     - Ciprofloxacin (resistance is increasing)
     - Erythromycin
3. **Zinc Supplementation:**
   - For children under 5 years, zinc supplementation (10-20 mg daily for 10-14 days) reduces the duration and severity of diarrhea and prevents future episodes.
4. **Nutritional Support:**
   - Continue feeding (especially breastfeeding for infants) as soon as the patient can eat. Avoid foods high in simple sugars.
5. **Monitoring:**
   - Closely monitor hydration status, urine output, vital signs, and electrolyte balance.
6. **Public Health Measures (for control and prevention):**
   - Safe water supply.
   - Proper sanitation and hygiene promotion (handwashing).
   - Safe food handling practices.
   - Health education.
   - Surveillance and early outbreak detection.
   - Vaccination in high-risk areas or during outbreaks (Oral Cholera Vaccines - OCVs).

6. Discuss about the methods of water purification in small scale. [5]

Small-scale water purification methods are crucial for households and small communities, especially where access to safe municipal water is limited or during emergencies. These methods aim to remove or kill pathogenic microorganisms and reduce turbidity and chemical contaminants.

1. **Boiling:**
   - **Process:** Heating water to a rolling boil for at least 1 minute (3 minutes at altitudes above 2000m).
   - **Effectiveness:** Kills most bacteria, viruses, and protozoan cysts (e.g., Giardia, Cryptosporidium).

- **Advantages:** Simple, effective against pathogens, widely understood.
- **Disadvantages:** Requires fuel (can be scarce or expensive), does not remove chemical pollutants or turbidity, water needs to cool before drinking, changes taste slightly.

2. **Solar Water Disinfection (SODIS):**
   - **Process:** Filling clear PET plastic bottles with low-turbidity water and exposing them to direct sunlight for at least 6 hours (or 2 days if cloudy).
   - **Effectiveness:** UV-A radiation and increased temperature kill bacteria and viruses. Less effective against some protozoan cysts if water is turbid.
   - **Advantages:** Very low cost, uses readily available materials (sunlight, plastic bottles), environmentally friendly.
   - **Disadvantages:** Requires sunny weather, slow process, only suitable for small volumes, water must be low turbidity, bottles can degrade over time.
3. **Chlorination:**
   - **Process:** Adding a specific amount of chlorine (liquid bleach/sodium hypochlorite, chlorine tablets like Aquatabs, Piyush, or bleaching powder solution) to water and allowing a contact time of at least 30 minutes.
   - **Effectiveness:** Kills most bacteria and viruses. Less effective against some protozoan cysts (e.g., Cryptosporidium).
   - **Advantages:** Relatively inexpensive, provides residual protection against recontamination, easy to use for larger small-scale volumes.
   - **Disadvantages:** Taste and odor can be unpleasant if overdosed, effectiveness reduced by turbidity, requires careful measurement, some pathogens are chlorine-resistant.
4. **Household Filtration:**
   - **Ceramic Filters:** Porous ceramic candle or pot filters. Water passes through the ceramic material, which physically removes bacteria, protozoa, and turbidity. Some are impregnated with silver to prevent bacterial growth on the filter.
     - *Advantages:* Effective removal of bacteria and protozoa, improves water clarity and taste, long-lasting if maintained.
     - *Disadvantages:* Slow filtration rate, filters need regular cleaning and can break, do not remove viruses effectively unless specifically designed (e.g., with very small pore size or additional disinfection stage).
   - **Biosand Filters:** Layers of sand and gravel. A biological layer ("schmutzdecke") develops on top, which helps remove pathogens.
     - *Advantages:* Effective, can be built locally, long-lasting.
     - *Disadvantages:* Heavier, slower filtration, requires specific construction and maintenance.
   - **Cloth Filtration:** Folding a clean cotton cloth multiple times and pouring water through it.
     - *Effectiveness:* Primarily removes larger particles, turbidity, and some larger parasites (like guinea worm larvae or copepods carrying cholera vibrios). Not effective against bacteria or viruses.
     - *Advantages:* Extremely simple, readily available material.
     - *Disadvantages:* Low effectiveness against most microbial pathogens. Best used as a pre-treatment.

5. **Flocculation/Coagulation and Sedimentation:**
    - **Process:** Adding a coagulant (like alum, moringa seeds, or commercial flocculants) to turbid water. The coagulant causes small suspended particles to clump together (flocculation) and settle at the bottom (sedimentation). The clearer water is then decanted.
    - **Effectiveness:** Reduces turbidity and can remove some pathogens attached to particles.
    - **Advantages:** Improves clarity, can be a pre-treatment for other methods like chlorination or SODIS.
    - **Disadvantages:** Does not fully disinfect water on its own; requires subsequent disinfection.

Often, a combination of methods (e.g., sedimentation followed by boiling or chlorination) is most effective.

7. Mention the causative agent, mode of transmission, clinical features, management and preventive measures of tuberculosis. [10]

Tuberculosis (TB) is a chronic infectious disease primarily affecting the lungs (pulmonary TB) but can also affect other parts of the body (extrapulmonary TB).

- **Causative Agent:**
    - *Mycobacterium tuberculosis* complex. The most common species causing human TB is *Mycobacterium tuberculosis*. Other species in the complex include *M. bovis*, *M. africanum*, and *M. microti*.
    - These are acid-fast bacilli (AFB) due to their waxy cell wall, making them resistant to common disinfectants and requiring special staining techniques (Ziehl-Neelsen stain) for visualization.
- **Mode of Transmission:**
    - **Airborne Spread:** Primarily transmitted through the inhalation of droplet nuclei (aerosols containing *M. tuberculosis*) expelled when a person with infectious pulmonary or laryngeal TB coughs, sneezes, speaks, or sings.
    - These tiny droplets can remain suspended in the air for several hours.
    - Prolonged close contact with an infectious TB case increases the risk of transmission.
    - Rarely, transmission can occur through ingestion of unpasteurized milk from cattle infected with *M. bovis* (causing gastrointestinal TB).
- **Clinical Features:**
  Symptoms vary depending on whether it's pulmonary or extrapulmonary TB, and whether it's active disease or latent infection. Latent TB Infection (LTBI) is asymptomatic. Active TB disease symptoms include:
    - **Pulmonary TB (most common):**
        - Persistent cough for 2 weeks or more, often with sputum production.
        - Sputum may be blood-stained (hemoptysis).
        - Chest pain (often pleuritic).
        - Shortness of breath (in advanced cases).
        - Systemic symptoms:
            - Fever (often low-grade, evening rise).
            - Night sweats.
            - Unexplained weight loss.
            - Loss of appetite (anorexia).

        - Fatigue and malaise.
    - **Extrapulmonary TB (EPTB):** Symptoms depend on the site affected:
        - **Lymph node TB (Tuberculous lymphadenitis):** Painless swelling of lymph nodes, commonly in the neck.
        - **Pleural TB:** Chest pain, fever, pleural effusion.
        - **TB meningitis:** Headache, fever, stiff neck, altered mental status.
        - **Bone and Joint TB (Pott's disease if spine is affected):** Pain, deformity, limited movement.
        - **Genitourinary TB:** Dysuria, hematuria, flank pain.
        - **Miliary TB (Disseminated TB):** Widespread infection, severe systemic symptoms.
- **Management (Treatment):**
  The standard treatment for drug-susceptible TB is a multi-drug regimen under Directly Observed Treatment, Short-course (DOTS).
    1. **Intensive Phase (Initial 2 months):** Four drugs daily:
        - Isoniazid (H)
        - Rifampicin (R)
        - Pyrazinamide (Z)
        - Ethambutol (E)
          (HRZE)
    2. **Continuation Phase (Following 4 months):** Two drugs daily or thrice weekly:
        - Isoniazid (H)
        - Rifampicin (R)
          (HR)
    - **Total duration:** Typically 6 months for new, uncomplicated pulmonary TB. Longer duration (9-12 months or more) for EPTB (e.g., meningitis, bone TB) or drug-resistant TB.
    - **Directly Observed Treatment (DOT):** A trained healthcare worker or community volunteer observes the patient swallowing each dose of medication to ensure adherence.
    - **Drug-Resistant TB (MDR-TB, XDR-TB):** Requires specialized, longer, and more toxic second-line drug regimens, managed by experienced clinicians.
    - **Supportive Care:** Nutritional support, management of side effects, counseling.
- **Preventive Measures:**
    1. **Case Finding and Treatment:** Early diagnosis and effective treatment of active TB cases is the most crucial preventive measure to interrupt transmission.
    2. **BCG (Bacille Calmette-Guérin) Vaccination:** Given to infants at birth or shortly after in endemic countries like Nepal. Primarily protects against severe forms of childhood TB (e.g., TB meningitis, miliary TB). Does not prevent primary infection or reactivation of latent TB in adults effectively.
    3. **Contact Tracing and Isoniazid Preventive Therapy (IPT):**
        - Identifying close contacts of infectious TB cases (especially children under 5 and HIV-infected individuals).
        - Screening contacts for active TB.
        - Providing IPT (usually isoniazid for 6-9 months) to those with LTBI to prevent progression to active disease.

4. **Infection Control Measures in Healthcare Settings:**
    - Administrative controls (e.g., TB infection control plan, rapid diagnosis).
    - Environmental controls (e.g., good ventilation, UV germicidal irradiation).
    - Personal respiratory protection (e.g., N95 respirators for healthcare workers).
    - Educating patients on cough etiquette.
5. **Improving Socio-economic Conditions:** Addressing poverty, malnutrition, and overcrowding can reduce TB vulnerability.
6. **Health Education:** Raising awareness about TB symptoms, transmission, and the importance of completing treatment.
7. **HIV/TB Co-infection Management:** Screening TB patients for HIV and vice-versa. ART for HIV-positive individuals and IPT for those without active TB.

8. Discuss the various approaches of vector control. [10]

Vector control aims to reduce or eliminate the populations of vectors (such as mosquitoes, ticks, flies, fleas) that transmit diseases, or to prevent them from biting humans. Effective vector control is crucial for preventing vector-borne diseases like malaria, dengue, Japanese encephalitis, kala-azar, etc. Approaches can be broadly categorized:

1. **Environmental Management (Source Reduction):**
   Modifying the environment to reduce vector breeding sites and human-vector contact.
    - **Modification of Breeding Sites:**
        - **Drainage:** Draining stagnant water bodies (ponds, marshes, ditches) where mosquitoes breed.
        - **Filling:** Filling in unnecessary water collections (pits, depressions).
        - **Water Management:** Proper irrigation practices in agriculture to prevent waterlogging. Intermittent irrigation for rice paddies.
        - **Covering Water Containers:** Ensuring domestic water storage containers (tanks, drums, pots) are tightly covered to prevent mosquito egg-laying.
        - **Solid Waste Management:** Proper disposal of solid waste (tires, cans, plastic containers) that can collect water and become breeding sites for mosquitoes like *Aedes*.
    - **Habitat Alteration:**
        - Clearing vegetation around homes and water bodies to reduce resting sites for adult vectors.
        - Channeling streams to increase water flow speed, making them less suitable for breeding.
2. **Chemical Control:**
   Using insecticides to kill vectors at larval or adult stages.
    - **Larviciding:** Applying chemical or biological larvicides to water bodies where vectors breed (e.g., Temephos for mosquito larvae).
    - **Indoor Residual Spraying (IRS):** Applying long-lasting insecticides to the interior walls and ceilings of houses where vectors (like malaria-transmitting mosquitoes) rest.
    - **Space Spraying (Fogging):** Dispersing insecticides as a fine mist or fog (Ultra Low Volume - ULV or thermal fogging) to kill adult flying insects, often used during outbreaks (e.g., dengue).
    - **Insecticide-Treated Nets (ITNs/LLINs):** Bed nets treated with insecticide (e.g., pyrethroids) that kill or repel mosquitoes, providing personal protection and community-level benefits when coverage is high.

- **Limitations:** Risk of insecticide resistance, environmental contamination, cost, potential human toxicity if not handled properly.

3. **Biological Control:**
   Introducing or encouraging natural enemies or pathogens of vectors.
   - **Predators:** Using larvivorous fish (e.g., Gambusia, Guppy) in water bodies to eat mosquito larvae. Dragonflies, copepods.
   - **Pathogens:** Using microbial agents like *Bacillus thuringiensis israelensis* (Bti) or *Bacillus sphaericus* which produce toxins specific to mosquito larvae.
   - **Parasites/Nematodes:** Some nematodes can parasitize vector larvae.
   - **Advantages:** Often environmentally specific and self-sustaining.
   - **Disadvantages:** May be slow to establish, effectiveness can vary, requires ecological understanding.
4. **Genetic Control:**
   Altering the genetic makeup of vector populations to reduce their ability to transmit disease or to suppress the population.
   - **Sterile Insect Technique (SIT):** Releasing large numbers of sterilized male insects that mate with wild females, resulting in no offspring, thus reducing the population.
   - **Genetically Modified Vectors:** Developing vectors that are resistant to pathogens (e.g., mosquitoes that cannot transmit dengue virus) or that carry lethal genes.
   - **Wolbachia:** Introducing *Wolbachia* bacteria into mosquito populations, which can block pathogen transmission or reduce mosquito lifespan.
   - **Challenges:** Complex, costly, public acceptance, ecological concerns. Still largely in research/pilot phases for many vectors.
5. **Personal Protection Measures:**
   Actions individuals can take to prevent vector bites.
   - **Using Insect Repellents:** Applying repellents containing DEET, Picaridin, or oil of lemon eucalyptus to exposed skin.
   - **Wearing Protective Clothing:** Long-sleeved shirts, long pants, socks, and shoes, especially during peak vector activity times. Light-colored clothing can be less attractive to some vectors.
   - **Screening Houses:** Using window and door screens to prevent vectors from entering homes.
   - **Using Bed Nets:** Sleeping under untreated or insecticide-treated bed nets.
   - **Avoiding Peak Biting Times:** Limiting outdoor activity when vectors are most active (e.g., dusk and dawn for many mosquitoes).
6. **Integrated Vector Management (IVM):**
   A rational decision-making process for the optimal use of resources for vector control. IVM involves:
   - **Evidence-based decision making:** Using local data on vector ecology, disease transmission, and effectiveness of interventions.
   - **Integration of methods:** Combining different control methods (chemical, biological, environmental) in a harmonious way.
   - **Collaboration within the health sector and with other sectors:** Involving communities, other government departments (e.g., agriculture, public works), and private sector.
   - **Advocacy, social mobilization, and legislation:** Building political will and community participation.

- **Capacity building:** Training personnel and strengthening infrastructure.
- **Monitoring and evaluation:** Assessing the impact of interventions and adapting strategies as needed.

Choosing the right combination of approaches depends on the specific vector, local ecology, disease, available resources, and socio-cultural context.

SECTION : B

9. Classify ARI with clinical features & management. [5]

Acute Respiratory Infections (ARIs) are infections of the respiratory tract, broadly classified based on anatomical location and severity. For practical management, especially in children, the WHO Integrated Management of Childhood Illness (IMCI) classification is widely used.

Classification (primarily for children under 5, based on IMCI):

- **Upper Respiratory Tract Infections (URTIs):**
  - **Common Cold:** Runny nose, sneezing, mild cough, sore throat, usually no fever or mild fever.
  - **Pharyngitis/Tonsillitis:** Sore throat, difficulty swallowing, redness/swelling of pharynx/tonsils, may have fever.
  - **Otitis Media (Ear Infection):** Ear pain, fever, irritability, sometimes ear discharge. (Though an ear infection, often grouped with ARI due to common preceding URTIs).
- **Lower Respiratory Tract Infections (LRTIs):**
  - **Pneumonia:** This is the most serious ARI and is further classified by severity:
    1. **No Pneumonia (Cough or Cold):** Cough, runny nose, no signs of pneumonia.
       - *Clinical Features:* No fast breathing, no chest indrawing.
       - *Management:* Symptomatic relief (soothe throat, relieve cough with safe remedies like warm fluids, honey for children >1 year), advise on when to return if symptoms worsen, ensure adequate fluid and food intake.
    2. **Pneumonia (Non-Severe):**
       - *Clinical Features:* **Fast breathing** (Tachypnea).
         - Age 2-12 months: ≥ 50 breaths/minute
         - Age 12 months - 5 years: ≥ 40 breaths/minute
           No chest indrawing or general danger signs.
       - *Management:* Oral antibiotic (e.g., Amoxicillin) for 5 days, advise mother on home care (continue feeding, fluids, soothe cough), follow-up in 2-3 days.
    3. **Severe Pneumonia:**
       - *Clinical Features:* **Chest indrawing** (lower chest wall draws in during inspiration) OR any **general danger sign** (unable to drink or breastfeed, vomits everything, convulsions, lethargy or unconsciousness, stridor in a calm child). Fast breathing is usually also present.

        - *Management:* **Urgent referral** to a hospital. Give first dose of an appropriate injectable antibiotic (e.g., Benzylpenicillin or Ampicillin + Gentamicin) before referral. Manage fever if present. If wheezing, give rapid-acting bronchodilator. Oxygen if available and signs of hypoxia.
    - **Bronchiolitis:** Common in infants < 2 years, often viral (RSV).
        - *Clinical Features:* Cough, rapid breathing, wheezing, chest indrawing, difficulty feeding.
        - *Management:* Supportive care (oxygen if hypoxic, hydration), bronchodilators may be tried but often not effective. Severe cases require hospitalization.

General Clinical Features of ARIs:

- Cough
- Runny or blocked nose
- Sore throat
- Fever
- Difficulty breathing / Fast breathing
- Wheezing
- Chest pain
- Irritability, lethargy (especially in children)

General Management Principles for ARIs:

- **Assessment:** Based on signs and symptoms (IMCI guidelines are crucial for children).
- **Supportive Care:**
    - Rest.
    - Adequate fluid intake to prevent dehydration.
    - Continued feeding/nutrition.
    - Symptomatic relief (e.g., paracetamol for fever/pain, saline nasal drops for congestion).
- **Antibiotics:** Only for bacterial infections (e.g., pneumonia, bacterial pharyngitis). Viral ARIs (like common cold, most bronchitis, bronchiolitis) do not respond to antibiotics.
- **Oxygen Therapy:** For severe cases with hypoxia.
- **Referral:** For severe cases or those with danger signs.
- **Prevention:** Immunization (e.g., against Hib, Pneumococcus, Measles, Pertussis), good nutrition, handwashing, avoiding smoke exposure, exclusive breastfeeding.

10. Write the risk factors, clinical features and management of type-2 diabetes mellitus. [5]

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by hyperglycemia (high blood glucose) resulting from a combination of insulin resistance (body cells don't respond effectively to insulin) and relative insulin deficiency (pancreas doesn't produce enough insulin).

Risk Factors for Type 2 Diabetes Mellitus:

- **Modifiable Risk Factors:**
    - **Overweight/Obesity:** Especially central (abdominal) obesity.
    - **Physical Inactivity:** Sedentary lifestyle.
    - **Unhealthy Diet:** High intake of processed foods, sugary drinks, saturated and trans fats; low intake of fiber.
    - **Smoking.**
    - **Hypertension (High Blood Pressure).**
    - **Dyslipidemia (Abnormal Blood Lipids):** High triglycerides, low HDL cholesterol.
    - **Gestational Diabetes Mellitus (GDM):** History of diabetes during pregnancy.
    - **Prediabetes:** Impaired glucose tolerance (IGT) or impaired fasting glucose (IFG).
- **Non-Modifiable Risk Factors:**
    - **Family History:** Having a first-degree relative with diabetes.
    - **Age:** Risk increases with age (typically >40-45 years, but increasingly seen in younger individuals).
    - **Ethnicity:** Certain ethnic groups have a higher predisposition (e.g., South Asians, Africans, Hispanics).
    - **Polycystic Ovary Syndrome (PCOS).**

Clinical Features of Type 2 Diabetes Mellitus:

Many individuals with T2DM may be asymptomatic for years, and the condition is often diagnosed during routine screening or when complications arise. When symptoms occur, they can include:

- **Classic Symptoms (Poly's):**
    - **Polyuria:** Frequent urination.
    - **Polydipsia:** Excessive thirst.
    - **Polyphagia:** Increased hunger (less common than in Type 1 DM).
- **Other Common Symptoms:**
    - Unexplained weight loss (despite increased hunger in some cases, or due to catabolism).
    - Fatigue, lethargy, weakness.
    - Blurred vision (due to changes in lens osmolarity).
    - Slow-healing sores or frequent infections (e.g., skin, urinary tract, yeast infections).
    - Numbness or tingling in hands or feet (neuropathy).
    - Acanthosis nigricans (dark, velvety patches of skin, often in neck or armpits), associated with insulin resistance.

Management of Type 2 Diabetes Mellitus:

Management is multifaceted and aims to control blood glucose levels, manage risk factors, and prevent complications.

1. **Lifestyle Modifications (Cornerstone of Management):**
    - **Medical Nutrition Therapy (MNT):** Healthy eating plan focusing on whole grains, fruits, vegetables, lean protein, and healthy fats. Portion control, reduced intake of refined carbohydrates, sugary drinks, and saturated/trans fats.

- **Regular Physical Activity:** At least 150 minutes of moderate-intensity aerobic exercise per week (e.g., brisk walking), plus muscle-strengthening activities 2-3 times per week.
- **Weight Management:** Aiming for a modest weight loss (5-10% of body weight) if overweight or obese.
- **Smoking Cessation.**

2. **Pharmacological Therapy (Oral Antidiabetic Drugs - OADs and/or Insulin):**
   - **Oral Antidiabetic Drugs:**
     - **Metformin:** Usually the first-line drug. Decreases hepatic glucose production and improves insulin sensitivity.
     - **Sulfonylureas (e.g., Gliclazide, Glimepiride):** Stimulate insulin secretion from the pancreas.
     - **Thiazolidinediones (TZDs, e.g., Pioglitazone):** Improve insulin sensitivity in peripheral tissues.
     - **DPP-4 Inhibitors (e.g., Sitagliptin, Vildagliptin):** Increase incretin levels, which stimulate insulin secretion and reduce glucagon secretion.
     - **SGLT2 Inhibitors (e.g., Dapagliflozin, Empagliflozin):** Increase glucose excretion in urine.
     - **GLP-1 Receptor Agonists (injectable, e.g., Liraglutide, Semaglutide):** Mimic incretin action.
   - **Insulin Therapy:** May be required if OADs and lifestyle changes are insufficient to control blood glucose, or at diagnosis if glucose levels are very high or patient is symptomatic/ketotic. Various types of insulin (basal, prandial, premixed) are available.
3. **Regular Monitoring:**
   - **Self-Monitoring of Blood Glucose (SMBG):** As advised by the healthcare provider.
   - **Glycated Hemoglobin (HbA1c):** Measured every 3-6 months to assess long-term glycemic control. Target is usually <7%.
   - Monitoring for complications: Regular eye exams, foot exams, kidney function tests, blood pressure, and lipid profile.
4. **Patient Education and Self-Management Support:**
   - Educating patients about diabetes, its management, potential complications, medication adherence, diet, exercise, and hypoglycemia/hyperglycemia recognition and management.
5. **Management of Co-morbidities:**
   - Controlling blood pressure and lipid levels.
   - Aspirin therapy for cardiovascular risk reduction in selected patients.

11. Define shock & classify. Write the first aid management of hypovolemic shock. [2+3=5]

- **Definition of Shock (2 marks):**
  Shock is a life-threatening medical condition characterized by **inadequate tissue perfusion**, leading to insufficient delivery of oxygen and nutrients to cells. This results in cellular dysfunction, organ damage, and if uncorrected, can lead to irreversible organ failure and death. It is essentially a state where the circulatory system fails to maintain adequate blood flow to meet the body's metabolic demands.
- **Classification of Shock (Adapted for brevity for 3 marks):**
  There are four main types of shock based on their underlying cause:
  1. **Hypovolemic Shock:** Caused by a critical reduction in intravascular volume (blood or plasma volume).

- *Examples:* Hemorrhage (trauma, GI bleeding), severe dehydration (diarrhea, vomiting, burns), third-spacing of fluid.

2. **Cardiogenic Shock:** Caused by primary pump failure of the heart, leading to decreased cardiac output.
    - *Examples:* Myocardial infarction (heart attack), severe arrhythmias, valvular heart disease, cardiomyopathy.
3. **Distributive Shock (Vasodilatory Shock):** Caused by widespread vasodilation, leading to a relative hypovolemia because the vascular space is too large for the circulating blood volume.
    - *Examples:*
        - **Septic Shock:** Due to overwhelming infection.
        - **Anaphylactic Shock:** Due to severe allergic reaction.
        - **Neurogenic Shock:** Due to spinal cord injury or certain drugs affecting sympathetic tone.
4. **Obstructive Shock:** Caused by a physical obstruction to blood flow into or out of the heart.
    - *Examples:* Tension pneumothorax, cardiac tamponade, massive pulmonary embolism.

- **First Aid Management of Hypovolemic Shock (Focus on what a first aider can do):**
  The primary goal of first aid for hypovolemic shock is to support vital functions and arrange urgent medical help.
    1. **Ensure Safety:** Ensure the scene is safe for yourself and the victim.
    2. **Call for Emergency Medical Services (EMS) immediately:** This is the most critical step. State clearly the location and suspected condition.
    3. **Control Obvious External Bleeding:** If hemorrhage is the cause:
        - Apply direct, firm pressure to the bleeding site using a clean cloth or dressing.
        - If direct pressure is not enough, and it's a limb, consider applying pressure to the appropriate pressure point.
        - Elevate the bleeding limb above the level of the heart if possible (unless a fracture is suspected).
        - A tourniquet should only be used as a last resort by trained individuals when bleeding is life-threatening and cannot be controlled by other means.
    4. **Position the Patient:**
        - Lay the person flat on their back (supine position).
        - Elevate their legs about 8-12 inches (20-30 cm) above the level of the heart (Trendelenburg or modified Trendelenburg position), unless there is suspected head, neck, spine, or leg injury, or if this causes breathing difficulty. This helps improve blood flow to vital organs.
        - If vomiting or unconscious, and no spinal injury is suspected, place them in the recovery position to maintain an open airway and prevent aspiration.
    5. **Maintain Airway, Breathing, Circulation (ABCs):**
        - Ensure the airway is open.
        - Monitor breathing. If breathing stops, be prepared to start CPR (if trained).
        - Check for pulse.
    6. **Keep the Person Warm:** Cover the person with a blanket or coat to prevent hypothermia, as shock can impair body temperature regulation. Avoid overheating.
    7. **Do Not Give Anything by Mouth:** Do not allow the person to eat or drink, even if they complain of thirst, as they may require surgery or anesthesia.

8. **Reassure the Patient:** Keep the person calm and comfortable. Provide emotional support.
9. **Monitor Vital Signs:** If possible, monitor level of consciousness, breathing rate, and pulse until EMS arrives. Report any changes.

13. Write the sign & symptoms and management of otitis media. [5]

Otitis Media (OM) is an inflammation or infection of the middle ear, the air-filled space behind the eardrum that contains the tiny vibrating bones of the ear. It's common in children.

Signs & Symptoms of Otitis Media:

Symptoms can vary depending on the type (acute, chronic, with effusion) and age of the individual.

- **Common in Children:**
  - **Ear pain (otalgia):** Often the most prominent symptom. Infants may pull or tug at their ear.
  - **Irritability and crying:** More than usual, especially when lying down.
  - **Fever:** May be high or low-grade.
  - **Difficulty sleeping.**
  - **Loss of appetite or difficulty feeding:** Sucking and swallowing can cause painful pressure changes in the middle ear.
  - **Ear discharge (otorrhea):** Fluid (pus or blood-tinged) draining from the ear canal if the eardrum has perforated.
  - **Hearing loss:** Temporary, muffled hearing or unresponsiveness to quiet sounds.
  - **Loss of balance** (less common).
  - **Vomiting or diarrhea** (sometimes, especially in younger children).
- **Common in Older Children and Adults:**
  - Ear pain.
  - Feeling of fullness or pressure in the ear.
  - Muffled hearing or temporary hearing loss.
  - Ear discharge (if eardrum perforates).
  - Dizziness or vertigo (less common).
  - Fever.

Management of Otitis Media:

Management depends on the type of OM, severity, age, and frequency of infections.

1. **Pain Relief:**
   - **Analgesics:** Paracetamol (acetaminophen) or ibuprofen are effective for pain and fever.
   - **Warm Compress:** Applying a warm, moist cloth to the outer ear can provide comfort.
   - **Anesthetic Ear Drops:** May be prescribed for severe pain if the eardrum is intact (e.g., lignocaine drops).
2. **Antibiotic Therapy (for Acute Otitis Media - AOM):**

- The decision to use antibiotics is based on age, certainty of diagnosis, and severity of symptoms.
- **Watchful Waiting/Observation:** For children >2 years with mild, unilateral AOM, or uncertain diagnosis, observation for 48-72 hours with symptomatic treatment is an option. Antibiotics are started if symptoms worsen or don't improve.
- **Antibiotics are generally recommended for:**
  - Children < 6 months with AOM.
  - Children 6 months to 2 years with certain AOM diagnosis.
  - Children > 2 years with severe AOM (moderate to severe otalgia, or fever ≥39°C) or bilateral AOM.
  - If ear discharge (otorrhea) is present.
- **First-line antibiotic:** Amoxicillin (or Amoxicillin-clavulanate if recent amoxicillin use or resistant suspected).
- Duration is typically 5-10 days depending on age and severity.

3. **Management of Otitis Media with Effusion (OME - "Glue Ear"):**
   - Fluid in the middle ear without signs of acute infection.
   - Often resolves spontaneously within 3 months.
   - **Monitoring:** Regular follow-up and hearing tests.
   - **Surgical Intervention:** If persistent OME (>3 months) with significant hearing loss or other complications:
     - **Myringotomy with Tympanostomy Tube (Grommet) Insertion:** A small incision is made in the eardrum, and a tiny tube is inserted to ventilate the middle ear and allow fluid to drain.
4. **Management of Chronic Suppurative Otitis Media (CSOM):**
   - Persistent ear discharge through a perforated eardrum for >2 weeks.
   - **Aural Toileting:** Regular cleaning of the ear canal (dry mopping or suction).
   - **Topical Antibiotic Ear Drops:** (e.g., ciprofloxacin drops).
   - Systemic antibiotics may be needed for acute exacerbations.
   - **Surgical Repair (Tympanoplasty):** May be considered to repair the perforated eardrum and improve hearing once the infection is controlled.
5. **Preventive Measures:**
   - Pneumococcal and influenza vaccinations.
   - Exclusive breastfeeding for at least 6 months.
   - Avoiding exposure to tobacco smoke.
   - Good hand hygiene to prevent URTIs.
   - Avoiding bottle propping for infants.

14. Explain the causes, clinical features and management of Pelvic Inflammatory Disease (PID). [5]

Pelvic Inflammatory Disease (PID) is an infection and inflammation of the upper female genital tract, including the uterus (endometritis), fallopian tubes (salpingitis), ovaries (oophoritis), and pelvic peritoneum. It's a serious complication of some sexually transmitted infections (STIs) and other infections.

Causes of PID:

PID is usually caused by bacteria ascending from the vagina and cervix into the upper genital tract.

- **Common Bacterial Pathogens:**
  - **Sexually Transmitted Infections (STIs):**
    - *Neisseria gonorrhoeae* (gonorrhea) - a major cause.
    - *Chlamydia trachomatis* (chlamydia) - another major cause.
  - **Other Bacteria:**
    - Anaerobic bacteria (e.g., *Bacteroides*, *Peptostreptococcus*).
    - Aerobic bacteria (e.g., *Gardnerella vaginalis*, *Haemophilus influenzae*, *Streptococcus agalactiae*, enteric Gram-negative rods like *E. coli*).
    - *Mycoplasma genitalium*.
      These organisms can be part of the normal vaginal flora or introduced.
- **Risk Factors for Ascending Infection:**
  - Multiple sexual partners or a partner with an STI.
  - History of PID or STIs.
  - Young age at first sexual intercourse.
  - Intrauterine device (IUD) insertion (risk is highest in the first few weeks after insertion, especially if an underlying STI is present).
  - Uterine instrumentation (e.g., D&C, abortion, hysteroscopy).
  - Vaginal douching (can push bacteria upwards).
  - Bacterial vaginosis.

Clinical Features of PID:

Symptoms can range from mild or absent to severe. Minimum criteria for empirical treatment often include lower abdominal/pelvic pain and cervical motion tenderness, uterine tenderness, or adnexal tenderness on bimanual examination.

- **Common Symptoms:**
  - **Lower abdominal or pelvic pain:** Often bilateral, can be dull, crampy, or sharp.
  - **Abnormal vaginal discharge:** Often purulent (pus-like), with an unpleasant odor, may be yellow or green.
  - **Abnormal uterine bleeding:** Intermenstrual bleeding, postcoital bleeding, menorrhagia.
  - **Dyspareunia:** Pain during sexual intercourse.
  - **Fever and chills:** (May not always be present, especially in mild cases).
  - **Dysuria:** Painful urination.
  - Nausea and vomiting (less common, suggests more severe disease).
- **Signs on Examination:**

- **Cervical motion tenderness ("chandelier sign"):** Pain elicited on moving the cervix during bimanual pelvic exam.
- **Uterine tenderness.**
- **Adnexal tenderness** (tenderness of ovaries and fallopian tubes).
- Purulent endocervical discharge.
- Elevated temperature (≥38.3°C or 101°F).
- Elevated erythrocyte sedimentation rate (ESR) or C-reactive protein (CRP).
- Laboratory documentation of cervical infection with *N. gonorrhoeae* or *C. trachomatis*.

Management of PID:

Prompt treatment is crucial to prevent long-term complications such as infertility, ectopic pregnancy, and chronic pelvic pain.

1. **Antibiotic Therapy:**
   - **Broad-spectrum antibiotics** are essential to cover the likely polymicrobial nature of PID, including *N. gonorrhoeae*, *C. trachomatis*, and anaerobes.
   - **Empirical treatment** should be initiated as soon as PID is suspected.
   - Regimens can be outpatient or inpatient:
     - **Outpatient Regimens (for mild to moderate PID):**
       - Example: Ceftriaxone (single IM dose) PLUS Doxycycline (oral for 14 days) WITH or WITHOUT Metronidazole (oral for 14 days).
     - **Inpatient Regimens (for severe PID, pregnancy, tubo-ovarian abscess, unable to tolerate oral meds, or no response to outpatient therapy):**
       - Example: Cefotetan or Cefoxitin (IV) PLUS Doxycycline (IV or oral).
       - OR Clindamycin (IV) PLUS Gentamicin (IV).
       - Transition to oral therapy once clinically improved.
   - Treatment should continue for 14 days.
2. **Supportive Care:**
   - **Analgesia:** For pain relief (e.g., NSAIDs).
   - **Bed rest:** Especially during the acute phase.
   - **Hydration.**
3. **Partner Management:**
   - Sexual partners from the preceding 60 days should be evaluated and treated empirically for gonorrhea and chlamydia, regardless of their symptoms or diagnostic results, to prevent reinfection and further spread.
   - Advise abstinence from sexual intercourse until both patient and partner(s) have completed treatment and symptoms have resolved.
4. **Follow-up:**
   - Patients should be re-evaluated within 72 hours of starting treatment to assess clinical improvement. If no improvement, hospitalization or re-evaluation of diagnosis and treatment regimen is necessary.

- Test of cure for gonorrhea and chlamydia is recommended 3 months after treatment.
- Counseling on STIs, safe sex practices, and contraception.

5. **Management of Complications:**
   - **Tubo-ovarian abscess (TOA):** May require prolonged antibiotics, percutaneous drainage, or surgical intervention.
   - Hospitalization if complications are suspected or if patient is severely ill.

15. Define labor. Define the stages of labour. Write the differences between true labour and false labour. [5]

- **Definition of Labor:**
  Labor (also known as parturition) is the physiological process by which the fetus, placenta, and membranes are expelled from the uterus through the birth canal (vagina) to the outside world, typically occurring between 37 and 42 weeks of gestation. It is characterized by regular, painful uterine contractions that lead to progressive cervical effacement (thinning) and dilatation (opening).
- **Stages of Labor:**
  Labor is traditionally divided into three or four stages:
  1. **First Stage:**
     - Begins with the onset of regular, painful uterine contractions that cause progressive cervical effacement and dilatation.
     - Ends when the cervix is fully dilated to 10 centimeters.
     - This stage is further divided into:
       - **Latent Phase:** Early labor, cervix dilates slowly from 0 to about 4-6 cm. Contractions are usually mild and irregular, becoming more regular.
       - **Active Phase:** Cervix dilates more rapidly, typically from 4-6 cm to 10 cm. Contractions are stronger, longer, and more frequent.
  2. **Second Stage:**
     - Begins with full cervical dilatation (10 cm).
     - Ends with the birth (expulsion) of the baby.
     - Characterized by the mother's active pushing efforts (bearing down) with uterine contractions to move the baby through the birth canal.
  3. **Third Stage:**
     - Begins immediately after the birth of the baby.
     - Ends with the delivery (expulsion) of the placenta and membranes.
     - Involves uterine contractions that cause the placenta to separate from the uterine wall and be expelled.
  4. **Fourth Stage (Often considered part of the immediate postpartum period):**
     - The first 1-4 hours after the delivery of the placenta.
     - A critical period for monitoring the mother for postpartum hemorrhage and for initial bonding between mother and baby. The uterus contracts to control bleeding.
- **Differences between True Labor and False Labor:**

Feature	True Labor	False Labor (Braxton Hicks Contractions)
Contractions		
- Regularity	Occur at regular intervals	Irregular, do not establish a pattern
- Frequency	Intervals gradually shorten	Intervals remain long and irregular
- Intensity	Gradually increase in strength	Usually remain same intensity, or may decrease
- Duration	Gradually increase in length	Usually remain same duration
- Effect of Activity	Continue or intensify with walking/activity	May stop or lessen with walking or rest/change of position
- Location of Pain	Usually starts in the lower back, radiates to abdomen	Often felt primarily in the lower abdomen/groin
Cervical Changes	Progressive effacement and dilatation of cervix	No significant cervical change (no dilatation or effacement)
Bloody Show	Often present (pinkish/brownish mucus discharge)	Usually absent
Membranes	May rupture (water breaks)	Usually intact
Sedation Effect	Contractions persist despite sedation	Contractions often relieved by sedation

16. Discuss the process of Cardiopulmonary Resuscitation. [10]

Cardiopulmonary Resuscitation (CPR) is an emergency life-saving procedure performed when someone's breathing or heartbeat has stopped (cardiac arrest). The goal of CPR is to maintain circulation of oxygenated blood to the brain and other vital organs until definitive medical treatment can restore normal heart rhythm and breathing. The process follows specific guidelines, often from organizations like the American Heart Association (AHA) or European Resuscitation Council (ERC).

The Basic Process of CPR (for Adults, based on current general guidelines):

DRS-CABD or DR-CABS (Danger, Response, Send for help - Circulation, Airway, Breathing, Defibrillation)

1. **D - Danger (Scene Safety):**
    - **Assess the scene:** Before approaching the victim, ensure the environment is safe for you, the victim, and any bystanders. Look for hazards like traffic, fire, electrical wires, or unstable structures.

- If the scene is unsafe, do not enter until it's made safe. If possible, move the victim to a safer location (only if you can do so without endangering yourself or worsening victim's potential injuries like spinal injury).

2. **R - Response:**
   - **Check for responsiveness:** Tap the victim firmly on the shoulders and shout, "Are you okay?" or "Can you hear me?"
   - Observe for any movement, sound, or eye-opening.
3. **S - Send for Help (or Shout for Help):**
   - **If unresponsive:** Immediately call for emergency medical services (e.g., call 100, 101, 102 in Nepal, or the local emergency number) or instruct a specific bystander to do so.
   - Clearly state your location, what has happened, the number of victims, and the victim's condition.
   - If an Automated External Defibrillator (AED) is available nearby, ask someone to bring it. If you are alone, activate EMS yourself (many phones have speaker mode).
4. **C - Circulation (Chest Compressions):**
   - **Position the Victim:** Lay the victim flat on their back on a firm, flat surface.
   - **Check for Breathing and Pulse (Simultaneously or Quickly):**
     - Scan the chest for normal breathing (occasional gasps or agonal breaths are NOT normal breathing) for no more than 5-10 seconds.
     - For healthcare providers: Simultaneously check for a carotid pulse for no more than 10 seconds.
     - For lay rescuers: If the victim is unresponsive and not breathing normally, assume cardiac arrest and start compressions. Do not delay compressions to check for a pulse if you are not trained.
   - **Begin Chest Compressions (If no normal breathing/pulse):**
     - **Hand Position:** Place the heel of one hand on the center of the victim's chest, on the lower half of the sternum (breastbone), between the nipples. Place the heel of your other hand on top of the first hand. Interlock your fingers or keep them off the chest.
     - **Body Position:** Position your shoulders directly over your hands with your elbows locked and arms straight. Use your upper body weight to deliver compressions.
     - **Compression Rate:** Push hard and fast at a rate of **100 to 120 compressions per minute**. (Think of the beat of the song "Stayin' Alive").
     - **Compression Depth:** For adults, compress the chest at least **2 inches (5 cm) but not more than 2.4 inches (6 cm)**.
     - **Recoil:** Allow the chest to recoil completely after each compression to allow the heart to refill with blood. Do not lean on the chest between compressions.
     - **Minimize Interruptions:** Interruptions in chest compressions should be minimized (e.g., less than 10 seconds).
5. **A - Airway:**
   - **Open the Airway:** After 30 compressions (for single rescuer), open the airway using the **head-tilt/chin-lift maneuver**.
     - Place one hand on the victim's forehead and gently tilt the head back.
     - With your other hand, use your fingertips to lift the chin to open the airway.
     - If a spinal injury is suspected, use the jaw-thrust maneuver (if trained).

6. **B - Breathing (Rescue Breaths):**
    - **Give 2 Rescue Breaths:**
        - Ensure the airway is open.
        - Pinch the victim's nose shut.
        - Take a normal breath and make a complete seal over the victim's mouth with your mouth.
        - Give one breath lasting about 1 second, ensuring you see the chest rise.
        - Allow the chest to fall, then deliver a second breath.
        - If the chest does not rise, reposition the airway and try again. Do not attempt more than two breaths before returning to compressions.
        - If using a barrier device (e.g., pocket mask, bag-valve mask), use it according to its instructions.
7. **Cycles of CPR:**
    - Continue cycles of **30 chest compressions followed by 2 rescue breaths**.
    - If an AED is available and arrives, use it as soon as possible.
8. **D - Defibrillation (Using an AED):**
    - **Turn on the AED:** As soon as an AED is available, turn it on and follow the voice and visual prompts.
    - **Attach AED Pads:** Expose the victim's chest. Attach the adhesive electrode pads to the bare chest as shown on the pads or device.
    - **Analyze Rhythm:** Ensure no one is touching the victim while the AED analyzes the heart rhythm. The AED will state "Analyzing rhythm, do not touch the patient."
    - **Shock if Advised:** If a shockable rhythm is detected, the AED will advise a shock. Ensure no one is touching the victim ("Clear!"). Press the shock button.
    - **Resume CPR:** Immediately after the shock is delivered (or if no shock is advised), resume chest compressions (starting with compressions) and continue CPR for 2 minutes (about 5 cycles) before the AED re-analyzes.

Continue CPR and AED use until:

- The victim shows signs of life (e.g., starts breathing normally, moving).
- Emergency medical services (EMS) or other trained personnel arrive and take over.
- The scene becomes unsafe.
- You become too exhausted to continue.

Important Considerations:

- **Teamwork:** If more than one rescuer is present, switch roles (compressor/ventilator) every 2 minutes or 5 cycles to prevent fatigue and maintain high-quality compressions.
- **Modifications for Children and Infants:** Compression depth, hand placement, and compression-to-ventilation ratios may differ. For witnessed sudden collapse in children, immediate EMS activation is key. For unwitnessed collapse, 2 minutes of CPR before activating EMS (if alone).
- **Hands-Only CPR:** For untrained lay rescuers or those uncomfortable with rescue breaths, continuous chest compressions (Hands-Only CPR) are recommended for adult victims of sudden cardiac arrest.

- **Training:** Formal CPR training from a certified organization is highly recommended to learn and practice these skills correctly. Guidelines are periodically updated.

The end