1) Define nutrients & essential nutrients?

Ans: Nutrients are the organic materials in foods, which help in nourishing the body. They are the chemical substances obtained from food & used in the body to provide energy, to support growth, maintenance & repair of the body's tissues. They may also reduce the risks of degenerative diseases. An essential nutrient is a nutrient that the body cannot synthesize on its own & must be provided by the diet. These nutrients are necessary for the body to function properly. The six essential nutrients include carbohydrates, protein, fats, vitamins, minerals and water.

2) Classification of nutrients.

Ans: Nutrients are generally divided into macronutrients & micronutrients. Macronutrients constitute the bulk of the diet & are needed in large quantities & supply energy as well as essential nutrients needed for growth, maintenance, & activity. They include carbohydrates, proteins, fats & water.Minerals & vitamins are called *'micronutrients'* as they are required to the body in small quantities.

3) Write on major functions of essential nutrients present in foods.

Ans: The major functions of food are to support physiological status & maintain health by providing body building & regulatory activities of the body, besides it should also provide psychological satisfaction by relieving hunger. The major functions of essential nutrients are supplying energy for the normal growth, development of body tissues, metabolism, regulation of metabolic processes, protection against infections, etc.

4) Write a note on Vitamins.

Ans:Vitamins are a group of organic substances required in trace amounts for the normal metabolic functions, growth & maintenance of the body. Unlike carbohydrates, proteins & fats, vitamins are not an energy source but they play crucial roles in extracting energy from these nutrients. They are divided into two groups – water soluble & fat soluble vitamins. Vitamins are found in a wide variety of foods like; fruits, vegetables, grains, legumes, dairy products, meats & fats.

Water soluble vitamins/B-Complex vitamins include – Thiamin (B_1) , Riboflavin (B_2) , Niacin (B_3) , Pyridoxine (B_6) , Folate, Cyanocabalamin (B_{12}) , Pantothenic acid, Biotin & Vitamin C.

Fat soluble vitamins include – Vitamin A, D, E& K.

5) What are the main causes of nutritional deficiency diseases?

Ans: Nutritional deficiencies or malnutrition is the result of our body not getting enough of the nutrients it needs. Children are more at risk for serious complications due to nutritional deficiencies than adults. Deficiencies can lead to a variety of health problems. Any one or combination of these may result in nutritional deficiency. The main causes of nutritional deficiency are inadequate ingestion, inadequate absorption, inadequate utilization, increased excretion, increased requirement & increased destruction.

6) Differentiate between under nutrition & underweight.

Ans: Under nutrition is defined as the outcome of insufficient food intake & repeated infectious diseases. It includes being underweight for one's age, too short for one's age (stunted), too thin for one's height (wasted) & deficient in vitamins & minerals(micronutrient malnutrition). Underweight implies that the body weight of an individual is below the accepted average normal weight. The definition is usually made with reference to the body mass index (**BMI**). A BMI of under18.5 is usually referred to as underweight.

7) Define energy & its requirements.

Ans: Energy is the ability to do work. The energy contained within the chemical constituents of food can be either trapped within the chemical constituents of the body or used to produce heat. It is defined property of chemical compounds & other physical systems. Carbohydrates, fats, proteins in the diet are responsible for its energy content & are made available to the body when these compounds are oxidized in the energy-releasing reaction of respiration. The energy requirement of an individual is the level of energy intake from food that will balance energy expenditure.

8) Components of energy expenditure.

Ans: The human body's total energy needs can be divided into 3 components, they are

- 1) Energy required to maintain basal metabolism of the body (60%)
- 2) Energy required for the muscle movements or physical activity (25-30%)
- 3) The energy that is released as a result of the thermic effect of food (5-10%).



9) How to determine energy value of a food?

Ans: The amount of energy released from foods & the amount of energy expended by an individual can be obtained by direct & indirect calorimetry. The principle of direct calorimetry includes the chemical changes that occur when carbohydrates or fat are oxidized during respiration in the body. The amount of energy released or expended is measured by the heat produced. Whereas, in indirect calorimetry, the organic substance is completely combusted either in calorimetry or in the human body, & the oxygen consumed in amounts is directly related to the energy liberated as heat.

10) Units of energy.

Ans: The energy value of food is expressed in "**kilocalories**" & **is defined** as the amount of heat energy required to raise the temperature of 1 kg of water by 1°C at normal atmospheric pressure. Recently the International Union of Science & the International Union of Nutritional Science (IUNS) has adopted 'Joule' as the unit of energy instead of kcal. A joule is defined as the energy required to move 1 kg mass by 1 meter by force of 1 Newton acting on it.

11) Write a note on Physiological fuel value of foods.

Ans: Physiological fuel values are also called Atwater Bryant factors. The amount of energy actually available to the body from a given amount of nutrient is called physiological fuel value. The process of digestion does not take place in the human body with 100% efficiency. Therefore the entire amount of any ingested nutrient (carbohydrates, proteins, fats) is not completely available to the body. The coefficient of digestibility is used to express the proportion of an ingested nutrient that ultimately becomes available to the body's cells. The coefficient of

digestibility for carbohydrate, fat & protein are 0.98, 0.95 & 0.92 respectively & physiological energy values of carbohydrates, fats & proteins are **4**, **9** & **4** respectively.

12) Importance of RDA.

Ans: RDA is Recommended Dietary Allowance is defined as the intake of nutrient derived from diet which keeps nearly all people in good health. RDA are given for different age groups; adults, infants, children, pregnant women & lactating mothers, elderly people. RDA takes into account individual variation in nutrient needs & also the availability of nutrients which may vary from diet to diet. RDA is revised periodically by Expert Group of Indian Council of Medical Research (**ICMR**) & updated with newer concepts. RDA is based on Indian reference man & reference woman.

13) Write a short note on BMR.

Ans: BMR or basal metabolic rate is defined as the amount of energy required to carry on the involuntary work which include the functional activities of the various vital organs such as brain, heart, liver, kidney & lungs & also the secretory activities of glands, peristaltic movements of gastro intestinal tract, oxidation occurring in resting tissues, maintenance of muscle tone & body temperature of the body. BMR is affected by various factors such as body composition, gender, age, hereditary factors, body surface area, hormonal imbalances, pregnancy, nutritional status, etc.

14) Define BMI.

Ans: BMI or body mass index is a measure of relative size based on the mass and height of an individual. It is defined as the ratio of weight (kgs) to height² (meter) of an individual. It is used as a screening tool to indicate the nutritional status of a person & categorize them as underweight, overweight, and obese or has a healthy weight for their height.Range of BMI is as follows

- a) Underweight < 18.5
- b) Normal weight: 18.6 to 24.9
- c) Overweight: 25 to 29.9
- d) Obese > 30

15) Define reference man & reference woman.

Ans: **Reference man** – aged between 20-39 years & weighs 60kgs free from diseases & physically fit for active work. On each working day he is employed for 8 hours in occupation that usually involves moderate activity. While not at work he spends 8hours in bed, 4-6 hours sitting & moving about & 2 hours in walking & in active recreation or household duties. **Reference woman** – aged between 20-39 years & weighs 55 kgs. She is engaged in 8 hours in general household work or in light industry or in any other moderate active work. Apart from 8

hours in bed, she spends 4-6 hours sitting or moving around in light activity & 2 hours walking or in active recreation or household chores.