Chapter 5: Study the chapter summary and Fig 5-1, 5-2, 5-3, 5-5b, and 5-7.

1. **Integument** has A) cutaneous membrane = skin formed of a) outer epidermis b) inner dermis c) accessory structures, hair, nails and glands B) Subcutaneous Layer = Hypodermis.

2. **5 Functions of Integument**:
   a. Protection of deeper organs or tissues
   b. Temperature Maintenance
   c. Synthesis and Storage of nutrients – including Vitamin D₃
   d. Sensory reception – touch, pressure, temperature
   e. Excretion and secretion of salts, water and organic wastes

3. **Epidermis** is stratified squamous epithelium formed of 4 or 5 layers
   a. Stratum Germinativum – deep most layer of epidermis formed of stem cells that continuously divide to replace superficial layers of epidermis.
   b. Stratum Spinosum – spiny layer, next to basal layer, may continue to divide.
   c. Stratum Granulosum – grainy layer, produce keratin protein in large quantity
   d. Stratum Lucidum – glassy layer, present only in thick skin of palms and soles.
   e. Stratum Corneum – most superficial layer of epidermis has 15-30 layers of flattened dead cells.

4. **Skin Color** is due to blood supply and 2 pigments.
   a. **Melanin** synthesized by spidery cells = melanocytes – gives dark brown to black color to skin. Melanin protects the stem cells from effect of harmful UV Radiations. Overexposure to UV Radiations causes skin cancer.
   b. **Carotene** – absorbed with food, gives orange-yellow color to skin.

5. **Dermis** has outer Papillary layer and inner Reticular layer.
   a. Papillary layer is loose connective tissue and has projections, Dermal Papillae interlocked with Epidermal Ridges. It has blood vessels, lymphatic vessels and nerve supply in it. Dermal papillae and epidermal ridges form grooves on palms (finger prints) and soles to increase grip.
   b. Reticular Layer has rich mix of collagen and reticular fibers and form Dense Connective Tissue. This layer resists stretching of skin.

6. **Accessory Structures** include hair, nails and glands.

7. **Hairs** grow in hair follicles formed of lower layers of epidermis but lying in dermis. Part of hair in follicle is Root and part of hair exposed out of skin is Shaft. Hairs grow only at base inside hair follicle. All hair is formed of dead cells with abundant Keratin protein. Hair follicles remain active or inactive in a cyclic manner of 2-5 years.
   a. **Nails** are formed of protein keratin. Nail Body covers a nail bed with rich blood and nerve supply.
   b. **Glands** are of 2 kinds – Sebaceous and Sweat.
i. Sebaceous Glands secrete an oily lipid = Sebum. Most sebaceous glands open into hair follicles but some open directly to outside – Sebaceous follicles. Sebaceous Glands are Holocrine glands. Sebum lubricates the hair and skin and protects it against growth of bacteria.

ii. Apocrine Sweat Glands open into hair follicles of axilla = armpits, areola = dark area around nipples and groins. These secrete sweat rich in organic wastes. Bacteria develop easily and produce odor from this sweat. Apical part of cells secreting this sweat gets damaged.

iii. Merocrine Sweat Glands secrete watery sweat = perspiration over all surface of skin. No part of cells secreting perspiration gets damaged because these do not accumulate vesicles and release them by vesicular exocytosis.

8. **Local Homeostasis** in integumentary system does not involve Brain therefore called local.

9. **Injury and Repair:** If the skin gets injured it repairs itself quickly in 4 steps. Fig 5-9
   a. Injury → bleeding → mast cells → Inflammatory response
   b. A scab = blood clot fills the injury area and stem cells of epidermis start migrating below it.
   c. Stem cells undermine = erode the scab and form a continuous layer below it.
   d. Scab is shed, epidermis is complete but has a depression. Fibroblasts at first form an extensive network of capillaries that decline later and an extensive collagen network = Scar tissue develops.

10. **Skin Cancers** include basal cell Carcinoma and Melanoma. Melanoma develops from a melanocytes cell and develops as a black patch in skin. Basal cell carcinoma develops from a basal cell in stratum Germinativum.