



MUTHAYAMMAL ENGINEERING COLLEGE
(An Autonomous Institution)



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Anna University)

Rasipuram - 637 408, Namakkal Dist., Tamil Nadu

MUST KNOW CONCEPTS

MKC

BME &MDE

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Subject		19BMC01 & 19MDC01– Human Anatomy & Physiology		
UNIT-1 BASIC ELEMENTS OF HUMAN BODY				
S.No	Term	Notation (Symbol)	Concept/Definition/Meaning/Units/Equation/Expression	Units
1	Cell	-	A cell is the smallest unit of life. Cells are often called the "building blocks of life". The study of cells is called cell biology, cellular biology, or cytology.	-
2	Cell structure	-	A cell consists of three parts: the cell membrane, the nucleus, and, between the two, the cytoplasm	-
3	cell organelles	-	<ul style="list-style-type: none"> • Nucleus. • Ribosomes. • Endoplasmic reticulum. • Golgi apparatus. • Chloroplasts. • Mitochondria 	-
4	Cell membrane	-	The cell membrane is the semipermeable membrane of a cell that surrounds and	-
5	nucleus	-	The nucleus is the information centre of the cell and is surrounded by a nuclear membrane in all eukaryotic. A cell normally contains only one nucleus.	-
6	Ribosomes.	-	Ribosomes are minute particles consisting of RNA and associated proteins that function to synthesize proteins	-
7	Endoplasmic reticulum	-	It is a type of organelle made up of two subunits – rough endoplasmic reticulum, and smooth endoplasmic reticulum	-
8	Golgi apparatus.	-	The Golgi apparatus, also known as the Golgi complex, Golgi body, or simply the Golgi, is an organelle found in most eukaryotic cells.	-

9	Chloroplasts.	-	Chloroplasts are the food producers of the cell. The organelles are only found in plant cells and some protists such as algae	-
10	Mitochondria	-	Mitochondria are membrane-bound cell organelles (mitochondrion, singular) that generate most of the chemical energy needed to power the cell's biochemical reactions	-
11	Function of golgi apparatus	-	The Golgi apparatus, also known as the Golgi complex, Golgi body, or simply the Golgi, is an organelle found in most eukaryotic cells.	-
12	Function of mitochondria	-	The most prominent roles of mitochondria are to produce the energy currency of the cell, ATP (i.e., phosphorylation of ADP), through respiration, and to regulate cellular metabolism.	-
13	Functions of endoplasmic reticulum	-	The endoplasmic reticulum (ER) serves important functions particularly in the synthesis, folding, modification, and transport of proteins.	-
14	Origin of cell membrane potential	-	the membrane is selectively permeable to potassium, these positively charged ions can diffuse down the concentration gradient to the outside of the cell, leaving behind uncompensated negative charges. This separation of charges is what causes the membrane potential.	-
15	action potential	-	An action potential is defined as a sudden, fast, transitory, and propagating change of the resting membrane potential. Only neurons and muscle cells are capable of generating an action potential	-
16	tissue	-	A tissue is a group of cells, in close proximity, organized to perform one or more specific functions.	-
17	Specialized tissue	-	epithelial tissue, connective tissue, muscle tissue, and nervous tissue.	-
18	examples of specialized cells.	-	Nerve cells, blood cells, and reproductive cells	-
19	Epithelial tissues	-	They form the covering of all body surfaces, line body cavities and hollow organs, and are the major tissue in glands.	-
20	nervous	-	that controls the body's movements, sends and carries signals to and from the different parts of the body, and has a role in controlling bodily functions such as digestion	-
21	connective	-	Connective tissue is the tissue that connects, separates and supports all other types of tissues in the body it consists of	-

			cells surrounded by a compartment of fluid called the extracellular matrix (ECM)	
22	muscle	-	Muscle tissue is a soft tissue that composes muscles in animal bodies, and gives rise to muscles' ability to contract.	-
23	Types of Glands	-	<ul style="list-style-type: none"> • Salivary glands - secrete saliva. • Sweat glands- secrete sweat. 	-
24	Glands function	-	A gland is an organ which produces and releases substances that perform a specific function in the body	-
25	two types of glands	-	Exocrine and Endocrine.	-
UNIT -2 SKELETAL SYSTEM				
26	Bone	-	<ul style="list-style-type: none"> • It is a rigid organ that constitute part of the vertebrate skeleton in animal .It protect the various organ of the body. 	-
27	Types of bone	-	<ul style="list-style-type: none"> • Long • Short • Irregular • flat 	-
28	Bone cells	-	<ul style="list-style-type: none"> • It composed of four different cells osteoblasts, osteocytes, osteoclasts, bone lining cells. 	-
29	Osteoblasts	-	<ul style="list-style-type: none"> • Osteoblasts are the cells that form new bone. • They also come from the bone marrow & are related to structural cells. 	-
30	Osteocytes	-	<ul style="list-style-type: none"> • They are cells inside the bones. They come from osteoblasts. • Some of the osteoblasts turn into osteocytes while the new bone is being formed. 	-
31	Osteoclast	-	<ul style="list-style-type: none"> • A large multinucleate bone cell which absorbs bone tissue during growth and healing. 	-
32	Bone lining cells	-	<ul style="list-style-type: none"> • BLCs are postmitotic flat osteoblast lineage cells lining the bone 	-
33	Function of bones	-	<ul style="list-style-type: none"> • Support, movement, protection of blood cells, storage of ions, endocrine regulation. 	-
34	Skeleton	-	<ul style="list-style-type: none"> • It is the internal framework of the human body. It composed of around 270 bones at birth this total decrease to around 206 bones by adulthood. 	-
35	Skull	-	<ul style="list-style-type: none"> • Skull is the skeletal structure of the head that supports the face and protects the brain. 	-

36	Sinuses	-	<ul style="list-style-type: none"> • Sinuses are hallow space in the skull and the face bones around your nose. 	-
37	Fontanelless	-	<ul style="list-style-type: none"> • A fontanelle is an anatomical feature of the infant human skull comprising any of the soft membranous gaps between the cranical bones. 	-
38	Vertebral column	-	<ul style="list-style-type: none"> • It is known as the spinal column, is the central axis of the skeleton in all vertebrates. 	-
39	Typical vertebra	-	<ul style="list-style-type: none"> • It consists of the body and a vertebral arch. The is formed by thepaired pedides and paried laminea. 	-
40	Parts of vertebral column	-	<ul style="list-style-type: none"> • Cervical, thoracic, lumbar, sacrum. 	-
41	Cervical	-	<ul style="list-style-type: none"> • It provide mobility and stability to the head while connecting it to the relating immobile thoracic spine. 	-
42	Thoracic	-	<ul style="list-style-type: none"> • The main function of the thoracic spine is the hold the rid cage and protect the heart and lungs. 	-
43	Lumbar	-	<ul style="list-style-type: none"> • The lumbar vertebrae are in human anatomy the five vertebrae between the rid cage and the pelvis. 	-
44	sacrum	-	<ul style="list-style-type: none"> • Sacrum is a large, triangular bone at the base of the spine that forms by the fusing of sacral vertebrae. 	-
45	Function of vertebrae	-	<ul style="list-style-type: none"> • Protection, support, axis, movement. 	-
46	Movement of vertebrae	-	<ul style="list-style-type: none"> • Flexion, extension, rotation, lateral flexion. 	-
47	Sternum and ribs	-	<ul style="list-style-type: none"> • Sternum is a long, flat bone that forms the front of the ribs cage. • The cartilage of the top seven ribs join with the sternum at the sternocostal joints. 	-
48	Shoulder girdle	-	<ul style="list-style-type: none"> • The set of bones in the appendicular skeleton which connects to the arms 	-
49	Upper limb	-	<ul style="list-style-type: none"> • It consists of three sections the upper arm, forearm, hand. • It extends from the shoulder joints to the finger. 	-
50	Lower limb	-	<ul style="list-style-type: none"> • It consists of four major parts hip bone, thigh bone, leg and foots. • It is specialized for the support of weight, adaptation to gravity and locomotion. 	-

UNIT -3 CIRCULATORY SYSTEM				
51	Blood	-	Blood is a body fluid in humans and other animals that delivers necessary substances such as nutrients and oxygen to the cells.	-
52	Blood Composition	-	Blood has four main components <ul style="list-style-type: none"> • Plasma • Red blood cells (RBC) • White blood cells (WBC) • Platelets 	-
53	Functions of blood	-	<ul style="list-style-type: none"> • Transport oxygen and nutrients • Carrying cells and antibodies • Regulating body temperature • Bringing waste products to kidneys, liver 	-
54	Functions of RBC	-	RBC carry oxygen from lungs to the rest of our body. Then taking carbon dioxide back to our lungs to be exhaled.	-
55	Functions of WBC	-	They protect against illness and disease so they are called Immunity cells.	-
56	Types of WBC	-	<ul style="list-style-type: none"> • Neutrophils • Eosinophils • Basophils • Monocytes • Lymphocytes 	-
57	Neutrophils	-	They kill and digest bacteria and fungi. They are first line of defense.	-
58	Eosinophils	-	They attack and kill parasites and cancer cells and help with allergic responses.	-
59	Basophils	-	They secrete histamines, a marker of allergic disease, that help control the body's immune responses.	-
60	Monocytes	-	They have longer lifespan than many white blood cells and help to break down bacteria.	-
61	Lymphocytes	-	They create antibodies and fight against bacteria and viruses.	-
62	Blood group	-	It's a classification of blood, based on the presence and absence of antibodies and inherited antigenic substances on the surface of RBC.	-
63	Importance of blood group	-	Blood group is important when it comes to having a blood transfusion. The ABO classification is the most important and relevant for blood compatibility.	-

64	Blood group identification	-	Blood sample is mixed with antibodies against type A and B blood. The sample is checked to see whether or not the blood cells stick together. If the blood reacted with one of the antibodies.	-
65	Blood vessels	-	They are the channels through which blood is distributed to body tissues.	-
66	Types of blood vessels	-	<ul style="list-style-type: none"> • Arteries (arterioles) • Capillaries • Veins (venules) 	-
67	Structure of heart	-	The human heart is four chambered muscular organ, shaped and sized roughly like a man's closed fist with two-thirds of mass to the left of midline.	-
68	Properties of cardiac muscle	-	<ul style="list-style-type: none"> • Contractile • Rhythmicity • Excitability • Conductivity 	-
69	Conducting system of heart	-	<ul style="list-style-type: none"> • SA node • AV node • Bundle of his • Bundle branches • Purkinje fibres 	-
70	Cardiac cycle	-	Performance of the human heart from the ending of one heartbeat to the beginning of the next. Consist of diastole and systole.	-
71	ECG	-	Electro cardiogram (ECG) records the electrical signal from heart to check for different heart conditions.	-
72	Heart sound	-	Heart sounds are generated by blood flowing in and out of the heart's chambers through the valves as they open and close.	-
73	Pressure and volume changes	-	Once LVP exceeds aortic diastolic pressure, the aortic valve opens and ejection begins. During this phase the LV volume decreases as LVP increases to a peak value and decreases as ventricle begins to relax.	-
74	Regulation of heart rate	-	Heart rate is controlled by the two branches of the autonomic nervous system.	-
75	Coronary circulation	-	Coronary arteries supply oxygenated blood to the heart muscle, and cardiac veins drain away the blood once it has been	-

			deoxygenated.	
UNIT-4 URINARY AND NERVOUS SYSTEM				
76	Urinary system	-	The urinary system is also known as renal system or urinary tract consists of the kidneys ,ureters ,bladder and urethra.	-
77	Function of the urinary system	-	The urinary systems function is to filter the blood and create urine as a waste by-product.	-
78	kidney	-	One pair of organs located in the right and left side of the abdomen.The kidneys remove waste product from the blood and product urine.	-
79	Nephron	-	It is a functional unit of the kidney.The structure that actually produces urine in the process of removing waste and excess substances from the blood.	-
80	Urinary formation	-	There are main three steps of urinary formation: <ul style="list-style-type: none"> • Glomerular • Filtrations • Reabsorptions and secretions. 	-
81	Urinary reflex	-	Vesicoureteral reflux is the abnormal flow of urine from your bladder back up the tubes (ureters)that connect your kidney to your bladder.	-
82	Urinary tract	-	The urinary tract is the body's drainage system for removing urine, which is made up of wastes and extra fluid.	-
83	Neuron	-	The neuron is the basic unit of the brain. A specialized cell designed to transmit information to other nerve cells, muscles, or gland cells.	-
84	Types of neuron	-	There are three types Sensory neurons Motor neurons Inter neurons	-

85	Synapse	-	Synapse also called neuronal junction. The site of transmission of electric nerve impulses between two nerve cells ,or between a neuron and gland or muscle cell.	-
86	Types of synapses	-	There are two types <ul style="list-style-type: none"> • Electrical • chemical 	-
87	Action potential conduction	-	The action potential is conducted along the axon membrane by contiguous conduction and by saltatory conduction.	-
88	Brain division	-	The brain has three main parts Cerebrum cerebellum brain stem	-
89	Cortical localization	-	The theory of cortical localization of function holds that different cerebral cortical territories serve different functions such as vision and language.	-
90	EEG	-	Electroencephalography is an electrophysiological monitoring method to record electrical activity of the brain	-
91	Spinal cord	-	The spinal cord is the long , fragile , tube like structure that begins at the end of the brain stem and continues down almost to the bottom of the spine.	-
92	Function of spinal cord	-	The spinal cord is the highway for communication between the body and the brain. when the spinal cord is injured the exchange of information between the brain and others parts of the body is disrupted.	-
93	Sections of spinal cord	-	There are four sections of spinal cord Cervical	-

			Thoracic Lumbar sacral	
94	Tract of spinal cord	-	The white matter of the spinal cord is divided into the paired posterior(dorsal0 , lateral , anterior (ventral columns).	-
95	Ascending tract	-	The ascending tract carry sensory information from the body like pain up the spinal cord to brain.	-
96	Descending tract	-	It carry motor informations like instructions to move the arm, from the brain down the spinal cord to the body.	-
97	Spinal cord reflexes	-	Spinal cord reflexes are simple behaviors produced by central nervous system pathway that lie entirely within the spinal cord.	-
98	Types of spinal cord reflexes	-	Stretch reflex golgi tendon reflex crossed extensor reflex withdrawal reflex	-
99	Autonomic nervous system	-	The autonomic nervous system is a control system that acts largely unconsciously and regulates bodily function such as heart rate , digestion ,respiratory rate, urination.	-
100	Functions of autonomic nervous system	-	It regulates certain body process such as blood pressure and rate of breathing.the system works automatically without a person's conscious effort.	-
UNIT-5 MUSCLES AND JOINTS				
101	Muscle	-	A muscle is a group of muscle tissues which contracted together to produce force	-
102	Muscle tissue	-	It is a specialized tissue found in human body which functions by contracting and applies force to different parts of the body	-
103	Functions of muscle tissue	-	The general function of muscle tissue include the production of body movement, stabilization of the body positions.	-
104	Types of muscle tissue	-	<ul style="list-style-type: none"> • Cardiac muscle • Smooth muscle • Skeletal muscle 	-

105	Skeletal muscle	-	It is the muscle which is connected to the skeleton to form part of the mechanical system which moves the limbs and other parts of the body	-
106	Smooth muscle	-	It is the type of tissue found in the walls of hollow organs, such as the intestines, uterus and stomach	-
107	Cardiac muscle	-	It is an involuntary striated muscle tissue found only in the heart and is responsible for the ability of the heart to pump blood	-
108	Muscle tone	-	It is defined as the maintenance of partial contraction of a muscle, maintaining posture and balance and control proper function and other organ systems.	-
109	Fatigue	-	<ul style="list-style-type: none"> • It is the condition of lack of energy to complete task, exhaustion and tiredness. • Extreme tiredness resulting from mental or physical exertion or illness. 	-
110	Muscle fatigue	-	It is the condition when the muscle is unable to maintain its strength of contraction or tension. Muscle cannot produce enough ATP to its needs respectively, such condition is called muscle fatigue	-
111	Joint	-	The joint is a point where the two bones make contact.	-
112	Types of joints	-	<ul style="list-style-type: none"> • Synovial joint • Pivot joint • Hinge joint • Saddle joint • Ball and socket joint 	-
113	Fibrous joint	-	It is connected by dense connective tissue consisting collagen. These joints are called fixed joint or immovable joint.	-
114	Cartilaginous joints	-	It is the type of joint where the bones are entirely joined by cartilage of fibro cartilage. It allows partial movement of the joints respectively	-
115	Synovial joint	-	It is the joint that is surrounded by an articular capsule that defines a joint cavity filled with synovial fluid. It allows for the smooth movements between the adjacent bones.	-

116	Characteristics of synovial joints	-	<p>Synovial joints are made up of five classes of tissues ,</p> <ul style="list-style-type: none"> • Bone • Cartilage • Synovium • Synovial fluid • Tensile tissues composed of tendons and ligaments 	-
117	Shoulder joint	-	It is the type of ball and socket joint between the scapula and the humerus.it is the major joint connecting the upper limb to the trunk.	-
118	Elbow joint	-	It is the type of synovial joint found in the upper limb between the arm and the forearm.	-
119	Radioulnar joint	-	<p>It is presented in two locations in which the radius and ulna articulate the forearm.</p> <ul style="list-style-type: none"> • Proximal radioulnar joint • Distal radioulnar joint 	-
120	Hip joint	-	It joints the pelvis with the femur, which connects the axial skeleton with the lower extremity.	-
121	Knee joint	-	It is the hinge type synovial joint, which allows for flexion and extension.	-
122	Wrist joint	-	It is the type of synovial(candyloid) joint of the distal upper limb that connects and serves as a transition point between the forearm and hand	-
123	Ankle joint	-	It is the type of synovial joint that connects the bones of the leg, the tibia and fibula with the talus of the foot.	-
124	Joints of hand fingers	-	<p>Each fingers has three joints,</p> <ul style="list-style-type: none"> • Metacarpophalangeal joint(MCP) • Proximal interphalangeal joint(PIP) • Distal interphalangeal joint(DIP) 	-
125	Joints of foot toes	-	<p>Each big toe has two joints,</p> <ul style="list-style-type: none"> • Metatarsophalangeal joint • Interphalangeal joint <p>Except big toe each toes has three joints,</p> <ul style="list-style-type: none"> • Metatarsophalangeal joint(MCP) • Proximal interphalangeal joint(PIP) • Distal phalangeal joint(DP) 	-

PLACEMENT QUESTION AND ANSWERS

126	Biology	-	Biology is a natural science concerned with the study of life and living organisms	-
127	Mechanics	-	The branch of applied mathematics dealing with motion and forces producing motion	-
128	Biomechanics	-	The study of the mechanical laws relating to the movement or structure of living organisms	-
129	Ligaments	-	A short band of tough, flexible fibrous connective tissue which connects two bones or cartilages or holds together a joint.	-
130	Tendons	-	A tendon is a tough band of fibrous connective tissue that connects muscle to bone.	-
131	Spine	-	The spine is made up of 24 bones, called vertebrae. Ligaments and muscles connect these bones together and form what is called the spinal column.	-
132	Central Nervous System	-	Controls most functions of the body and mind.	-
133	Peripheral Nervous System	-	The primary role of the PNS is to connect the CNS to the organs, limbs, and skin.	-
134	Total No of Bones in Human Body	-	On Birth – 270 On Adults- 206	-
135	Epilepsy	-	(Neurological) disorder in which brain activity becomes abnormal.	-
136	Bone Structure	-	The outside of the bone consists of a layer of connective tissue called the periosteum.	-
137	Composition of Bones	-	Bone consists mainly of collagen fibers and an inorganic bone mineral in the form of small crystals. It also contains a small amount of other substances such as proteins and inorganic salts.	-
138	Types of Bones	-	4 Types – Long, Short, Flat & Irregular	-
139	Electrical properties of Bones	-	Electrical potentials are generated in the bone in response to generation of stress.	-
140	Crack propagation on Bones	-	The fracture mechanics of fatigue crack propagation in compact bone. Small cracks parallel to the long axis of the bone were initiated in standardized specimens of bovine bone.	-
141	Blood Pressure	-	Blood pressure is the force that a person's blood exerts against the walls of their blood vessels	-
142	Sphygmomanometer	-	An Instrument for measuring blood pressure	-
143	Stethoscope	-	The <i>stethoscope</i> is an acoustic medical device for auscultation, or listening to the internal sounds of an animal or human body.	-
144	Laminar Flow	-	Laminar flow is a flow regime characterized by high momentum diffusion and low momentum	-

			convection	
145	Turbulent Flow	-	In turbulent flow the speed of the fluid at a point is continuously undergoing changes in both magnitude and direction.	-
146	Arrhythmias	-	An arrhythmia is a problem with the rate or rhythm of your heartbeat.	-
147	Pacemaker	-	A pacemaker is a small device that's placed in the chest or abdomen to help control abnormal heart rhythms.	-
148	Bradycardia	-	Bradycardia is a heart rate that's too slow.	-
149	Tachycardia	-	Tachycardia is a condition that makes your heart beat more than 100 times per minute.	-
150	Fibrillation	-	Atrial fibrillation is a quivering or irregular heartbeat that can lead to blood clots, stroke, heart failure and other heart-related complications.	-
Faculty Prepared	Mrs.M.Birunda, Assistant Professor, Department of BME.		Signature	

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