U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June / July 2024 Semester End Make-Up Examinations

Programme: B.E. **Semester: III**
Branch: Mechanical Engineering **Duration: 1.5 hr.**
Course Code: 23ME3BSBFE **Max Marks: 50**
Course: Biology for Engineers

Instructions: 1. Answer all the questions in Part A. Answer any three questions from Part B.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

	PART A (Answer all Questions. Write the appropriate option and the complete answer)	*CO*	*PO*	Marks
1	The nucleus of the cell is called the control center because it: **a.** controls the function of all the organelles in the cell. **b.** contains all the genetic material for the cell. **c.** regulates the flow of substances into and out of the cell. **d.** resides at the center of the cell.	*CO1*	*PO1*	**01**
2	The plasma membrane is made up of: **a.** a rigid layer of protein. **b.** a double layer of protein and cholesterol. **c.** a double layer of phospholipids with cholesterol and proteins embedded at various spots. **d.** a rigid layer of carbohydrate and protein.	*CO1*	*PO1*	**01**
3	What is the chief purpose of the Golgi apparatus? **a.** Prepare and package proteins in vesicles for export to other parts of the body **b.** Synthesize proteins **c.** Break down protein the cell doesn't need **d.** Participate in cell division	*CO1*	*PO1*	**01**
4	What is the function of the mitochondria? **a.** To destroy bacteria **b.** To burn ATP for energy **c.** To store ATP **d.** To convert organic compounds into ATP	*CO1*	*PO1*	**01**
5	The hair-like processes on the surface of a cell that beat in waves to help propel materials across its surface are called: **a.** microvilli. **b.** flagella. **c.** cilia. **d.** centrioles.	*CO1*	*PO1*	**01**

	6	In brief, cancer occurs when: **a.** cells multiply faster than they die. **b.** cells leave the mitosis life cycle and enter the G-zero phase. **c.** cells divide in such a way that they form two chromosomes instead of a pair of attached chromatids. **d.** cells fail to synthesize protein.	*CO1*	*PO1*	**01**
	7	A single muscle cell is called **a.** myofilament. **b.** muscle fiber. **c.** myofibril. **d.** fascicle.	*CO1*	*PO1*	**01**
	8	The end of a muscle that's attached to the more mobile bone is called the: **a.** belly. **b.** prime mover. **c.** origin. **d.** insertion.	*CO1*	*PO1*	**01**
	9	During the process of muscle contraction, the sarcoplasmic reticulum is stimulated to release which substance? **a.** Calcium **b.** Acetylcholine **c.** ATP **d.** Acetylcholinesterase	*CO1*	*PO1*	**01**
	10	A tendon is an extension of what muscle component? **a.** Endomysium **b.** Epimysium **c.** Perimysium **d.** Sarcolemma	*CO1*	*PO1*	**01**
	11	Most fractures occur because bones lack: **a.** tensile strength. **b.** compressional strength. **c.** torsional strength. **d.** both tensile and compressional strength.	*CO1*	*PO1*	**01**
	12	What effect does physical stress have on bone? **a.** It stimulates osteoblasts to break down bone. **b.** It stimulates bone marrow to increase production of red blood cells. **c.** It impairs longitudinal growth. **d.** It stimulates osteocytes to create new bone.	*CO1*	*PO1*	**01**
	13	Osteoporosis increases a patient's risk for: **a.** an immune-system disorder. **b.** gut dysbiosis. **c.** bone fractures. **d.** a bone infection.	*CO1*	*PO1*	**01**
	14	What is the name of a fracture in which the bone pierces the skin? **a.** Greenstick **b**. Compound **c.** Comminuted **d.** Spiral	*CO1*	*PO1*	**01**
	15	The impulse-conducting cells of the nervous system are called: **a.** neuroglia. **b.** neurons. **c.** microglia. **d.** ependymal cells.	*CO1*	*PO1*	**01**
	16	Which neurons detect sensations such as touch or heat and then relay information about the stimuli to the central nervous system? **a.** Efferent neurons **b.** Interneurons **c.** Afferent neurons **d.** Schwann cell	*CO1*	*PO1*	**01**
	17	A nerve cell in which phase cannot respond to a new stimulus? **a.** Resting potential **b.** Action potential **c.** Repolarization **d.** Refractory period	*CO1*	*PO1*	**01**

	18	Which neurons connect incoming sensory pathways with outgoing motor pathways in the central nervous system: **a.** Efferent neurons **b.** Interneurons **c.** Afferent neurons **d.** Schwann cell	*CO1*	*PO1*	**01**
	19	Which statement correctly describes what occurs when a skeletal muscle contracts? **a.** Myosin and actin myofilaments form cross bridges, and the actin pulls the myosin myofilament toward the center of the sarcomere. **b.** The myosin and actin myofilaments shorten, pulling the Z-discs closer. **c.** After forming cross bridges with the actin myofilament, the myosin myofilament propels the actin myofilament toward the center of the sarcomere. **d.** The sarcomere shortens, pulling the actin and myosin myofilaments toward the center, which pulls the Z-discs closer together	*CO1*	*PO1*	**01**
	20	A continuous state of partial muscle contraction in which muscles are at their optimal resting length is called: **a**. muscle tone. **b.** incomplete tetanus. **c.** complete tetanus. **d.** twitch	*CO1*	*PO1*	**01**
		PART B **(Answer any 3 Questions.)**			
	1	Draw a neat schematic of a generic cell structure and label the organelle along with their primary function.	*CO1*	*PO1*	**10**
	2	A person whom you know has been diagnosed with osteoporosis. What are the things you would recommend to him/her to manage this condition? Provide a scientific rationale for your recommendations.	*CO1*	*PO1* *PO7*	**10**
	3	Discuss the active force-length, passive force-length, and total force-length relations of a muscle sarcomere with neat sketches.	*CO1*	*PO1*	**10**
	4	What is an exoskeleton? Explain different application scenarios of exoskeletons.	*CO2* *CO3*	*PO1* *PO7*	**10**
	5	A person whom you know has been diagnosed with knee osteoarthritis. What are the things you would recommend to him/her to manage this condition? Provide a scientific rationale for your recommendations.	*CO1*	*PO1* *PO7*	**10**

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