Reg. No															

B.Tech DEGREE EXAMINATION, NOVEMBER 2023

Seventh Semester

18BME469T - NEURO REHABILITATION AND HUMAN MACHINE INTERFACE

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	Declarative and Non-declarative memory belongs to..... (A) Short term memory (B) Working memory (C) Long term memory (D) Absence of memory	1	1	1
2.	The limbic system includes the ..... (A) amygdala, hypothalamus, hippocampus (B) hypothalamus, medulla, hippocampus (C) hippocampus, pons, thalamus (D) cerebellum, pons, hypothalamus	1	1	1
3.	The brain's ability to change its structure and function in response to experience or damage is called ..... (A) Neuroplasticity (B) Neuroreb (C) Neuromuscular (D) Nerve fiber	1	1	1
4.	..... is the main player in the brain when it comes to learning and memory. (A) Cerebellum (B) Medulla (C) Hippocampus (D) Temporal lobes	1	1	1
5.	..... size is measured as electromyographic (EMG) activity. (A) Spine reflex (B) Muscle (C) direct reflex (D) SSR or H-reflex	1	1	2
6.	..... cortical activity in the blind also occurs during sound localization. (A) Parietal (B) Occipital (C) Frontal (D) Temporal	1	1	2
7.	Exploration of spinal cord plasticity is essential for adequate understanding of ..... (A) motor skills (B) language (C) motor activities (D) speech	1	1	2
8.	Neuromodulators such as .....and norepinephrine have been suggested to influence the site and incidence of synaptic plasticity. (A) norepinephrine (B) Acetylcholine (ACh) (C) LTD (D) GABA	1	1	2
9.	.....is a member of the immunoglobulin (Ig) superfamily of proteins. (A) MAG (B) GAM (C) AMM (D) MGA	1	1	3

10.	.....contains a large unique region that inhibits both neurite growth and fibroblast spreading. (A) Noga-A (B) Noga-B (C) Noga-C (D) mylein	1	1	3
11.	The entire retina is regenerated from the ..... (A) Epithelium (B) retinal pigment epithelium (C) axon (D) optic nerve	1	1	3
12.	..... are macrophages that are the major resident immune cells in the CNS. (A) Glia (B) optic nerve (C) microglia (D) eyes	1	1	3
13.	HMI stands for ..... (A) Human Machine Interface (B) Human Machine Interaction (C) Human Machine Implementation (D) Human Machine Industry	1	1	4
14.	Visually or aesthetically pleasing composition does not possess (A) Balance (B) Unity (C) Sequential (D) Ambiguity	1	1	4
15.	An ..... is a graphical representation of a program or file that, when clicked on, will be run or opened. (A) Text (B) Icon (C) Message (D) Color	1	1	4
16.	A Human Machine Interface is used for ..... (A) controlling the PLC program and interfacing the SCADA both (B) allowing the user to interface with a device. (C) controlling the PLC. (D) interfacing the SCADA.	1	1	4
17.	..... type of cap is used to allow Brain Computer Interface to happen. (A) Baseball cap (B) Clay Cap with reinforcements (C) Electroencephalograph Cap (D) Magnetoencephalograph Cap	1	1	5
18.	How long does the process of Brain Computer Interface take? (A) 7 weeks (B) 7 days (C) 7 seconds (D) 7 minutes	1	1	5
19.	Robot manipulator consists of ..... many sections. (A) One (B) Two (C) Three (D) Four	1	1	5
20.	The standard form of DOF ..... (A) Degree of Finance (B) Degree of Freedom (C) Degree of Fix (D) Degree of Fail	1	1	5

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Interpret about the different types of motor control learning.	4	2	1
22.	Differentiate between the associative and non-associative memory.	4	2	1
23.	Recite about the spinal cord plasticity and its significance.	4	2	2
24.	Elucidate the different mechanisms underlying in the development of topographical axonal terminations.	4	2	2
25.	Explain about microglia signaling in neuroprotection.	4	2	3
26.	Summarize the different key enabling technologies and goals of the human machine interface (HMI).	4	2	4

		Marks	BL	CO
27.	Explain the classification of developmental stages of technology with respect to the technology readiness level.	4	2	5

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

28.	(a) Briefly about the degeneration and regeneration of the nerve injury.	12	3	1
	(OR)			
	(b) Differentiate the motor theories which helps in interaction of the body.			
29.	(a) Associate the different principles of plasticity in the human body.	12	3	2
	(OR)			
	(b) Explain the functional organization areas of the cerebral cortex in detail.			
30.	(a) Summarize in detail about the Limbic system and its function with the neat diagram.	12	3	3
	(OR)			
	(b) Elucidate the various types of motor controlled enabled system in the human body.			
31.	(a) Elaborate in detail about the process of EEG-fNIRS.	12	3	4
	(OR)			
	(b) Describe the process involved in multi-modal human machine interface study.			
32.	(a) Discuss about the robotic training principles.	12	3	5
	(OR)			
	(b) Explain the design and operation of the BCI system with neat diagram.			

* * * * *