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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: Institutional Elective **Duration: 3 hrs.**

Course Code: 23ET6OECHC **Max Marks: 100**

Course: Communication in Healthcare

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
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.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Discuss rural India's E-health and M-health paradigms of healthcare. Justify with current case studies.	*CO2*	*PO1, 2*	**07**
	b)		Discuss the extent and limitations of wearable health monitoring devices from patient participation and privacy of data standpoints.	*CO2*	*PO1, 2*	**07**
	c)		A telemedicine consultation center receives 45 patients per day. Assuming each of them generates 3 MB of electronic health record data, calculate total weekly storage needs (6 working days).	*CO2*	*PO1, 2*	**06**
			OR			
2	a)		Define telemedicine and illustrate its elements. Suggest a telemedicine solution for an area with hilly terrain and poor connectivity.	*CO2*	*PO1, 2*	**07**
	b)		Critically analyze technological and societal issues encountered in developing national digital health infrastructure.	*CO2*	*PO1, 2*	**07**
	c)		For a mobile health app with 1,000 subscribers and average monthly data usage of 20 MB, determine total monthly data load. What would be the increase in load if the number of users doubles every year?	*CO2*	*PO1, 2*	**06**
			UNIT - II			
3	a)		Compare Bluetooth, ZigBee, and Li-Fi based on range, power consumption, data rate, and hospital use.	*CO2*	*PO1, 2*	**07**
	b)		Describe RFID applications for real-time patient tracking in ICUs. Recommend enhancements with AI and cloud support.	*CO2*	*PO1, 2*	**07**
	c)		A hospital wireless LAN provides 40-meter coverage and 300 Mbps bandwidth. If teleconsultation requires 4.5 Mbps, how many sessions can be supported in parallel?	*CO2*	*PO1, 2*	**06**

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			OR			
	4	a)	Describe a Wi-Fi and ZigBee network solution for real-time telemetry in an emergency department. Address interference.	*CO2*	*PO1, 2*	**07**
		b)	Criticize the performance and viability of installing Li-Fi in operation theaters for sterile data transfer.	*CO2*	*PO1, 2*	**07**
		c)	512 KB packets are transmitted by a healthcare IoT device every 10 seconds. Calculate the data generated in an hour and in a day.	*CO2*	*PO1, 2*	**06**
			UNIT - III			
	5	a)	Highlight the operation of a smart hospital compared to a conventional hospital concerning efficiency, patient health outcomes, resource utilization, and workload on health workers. Use case study or real-world scenario.	*CO3*	*PO6*	**07**
		b)	Explain how Body Area Networks (BANs) can assist elderly patients with chronic diseases like heart disease or diabetes. Mention particular devices and benefits to carers.	*CO3*	*PO6*	**07**
		c)	An RFID system employed in a hospital scans 180 medical items in one second. Consider that the system is operated 3 hours/day for 7 days. Find: i)Scans performed within a week ii) Average scans per minute	*CO3*	*PO6*	**06**
			OR			
	6	a)	Critically analyze new technologies like robot-assisted surgery, AI diagnostics, and smart contact lenses. What are the technical, ethical, and regulatory problems that need to be solved in India?	*CO3*	*PO6*	**07**
		b)	Describe how IoT and AI are revolutionizing emergency medicine. Provide examples like predictive analytics, 5G network connectivity, and AI-based prioritizing patients based on severity.	*CO3*	*PO6*	**07**
		c)	A smart ambulance sends 10 MB of patient information every 2 minutes for a ride that lasts 40 minutes. Perform the following calculations: i) Total data per ambulance trip ii) Combined data load if 12 ambulances operate simultaneously	*CO3*	*PO6*	**06**
			UNIT - IV			
	7	a)	Draw a Deep Learning architecture from multimodal biosignals to diagnose early cardiac defects. Add dataset choice, model architecture, and inference flow.	*CO3*	*PO6*	**08**

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		b)	Describe how AR/VR can go beyond educating the patient to enable chronic disease management. Add examples such as VR smart plates and AR biofeedback.	*CO3*	*PO6*	**08**
		c)	A wearable heart rate sensor measures 78 bpm, and 10% of the beats are lost from noise in the signal. Calculate the true heart rate.	*CO3*	*PO6*	**04**
			OR			
	8	a)	Describe an AI model to forecast COVID-19 patient respiratory failure from SpO_2 trends. Provide training rationale and deployment on mobile.	*CO3*	*PO6*	**08**
		b)	Describe a blockchain-AI hybrid platform to monitor glucose level for ensuring data integrity and anomaly detection.	*CO3*	*PO6*	**08**
		c)	6 times an hour, a temperature is taken. If a patient is wearing it for 10 hours a day for one week, find: i) Total readings taken in the week ii) Size of data if each reading = 0.25 KB	*CO3*	*PO6*	**04**
			UNIT - V			
	9	a)	Distinguish Telecare and Telehealth through real-world usage-scenarios. Identify appropriate deployment scenarios.	*CO3*	*PO6*	**07**
		b)	List the mechanisms through which assistive smartphones enable aging in place. Include health monitoring, reminding, and emergency assistance.	*CO3*	*PO6*	**07**
		c)	Consider: For physiotherapy, one session of VR therapy creates 12 MB of video data. A patient gets 15 sessions/month. Compute: i)Total data monthly ii) Data size for 100 patients	*CO3*	*PO6*	**06**
			OR			
	10	a)	Critically compare safety and safety concerns of mobile (non-ionizing) and medical (ionizing) radiation. List 3 common myths and counterfacts.	*CO3*	*PO6*	**07**
		b)	Follow telemedicine through the life cycle of an individual. Recommend one major tech support in each phase.	*CO3*	*PO6*	**07**
		c)	A teleclinic located in a rural area sees 40 patients/day and every consultation yields 1.5 MB EHR. For 6 days in a week, calculate: i) Size of EHR in a week ii) Monthly data load	*CO3*	*PO6*	**06**

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