MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
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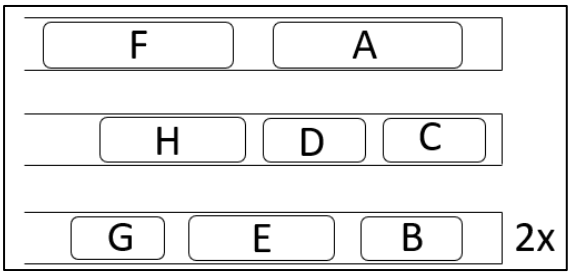
DEPARMENT OF MECHATRONICS
INTERNET WORKING FOR INDUSTRIES MTE 4057
VII SEMESTER B-TECH END SEM EXAMINATION NOV 2023

Time: 3hrs Max Marks: 50

Q no	Question	Marks	CO-PO-LO	BL
1	Explain the reason of delay distortion in the transmission signals within guided communication systems.	**2**	1-1,2,3-3,4,6,9,10	5
2	Compare and contrast in 3 points the Adaptive and Alternative Routing in case of Datagrams.	**3**	2-1,2,3-3,4,6,9,10,11	4
3	A tire manufacturing company is aiming to optimize processes, and envisioned a scenario where the integration of a new automated quality control system, real-time machine monitoring, and inventory management will enhance productivity and product quality. Following are the requirements. • Need for seamless communication among various machinery and systems, while prioritizing cost-effectiveness and easy implementation. • An Economical solution that can be swiftly installed without disrupting ongoing operations • Efficient facilitation of critical data exchange You are the Manufacturing Department Manager overseeing operations, which communication network would you choose for the requirements. Justify and explain the following details of the chosen model. 1. Architecture (with a suitable diagram) 2. Data frame with its transfer mechanism 3. How will it take of care of transfer of critical data exchange?	**5**	4-1,2,3,7,8-3,4,6,9,10,11,12	5
4	Estimate the encoding format for following code 10110110101 using Manchester and Differential Manchester techniques.	**2**	1-1,2,3-3,4,6,9,10	3
5	Perform the CRC Error Check with following details M=1010001101 P= $x^5 + x^4 + x^2 + 1$ FCS=5 Bits	**3**	1-1,2,3-3,4,6,9,10	3
6	Consider a Router with Acknowledgement Repeat Request (ARQ) system. Exemplify and compare Go Back ARQ and Selective reject ARQ.	**5**	2-1,2,3-3,4,6,9,10,11	5

7	Evaluate the fundamental principles which underlie the process of signal modulation within communication systems.	**2**	1-1,2,3-3,4,6,9,10	5
8	Distinguish between Multiple Access Techniques in terms of technique, application and advantages.	**3**	2-1,2,3-3,4,6,9,10,11	4
9	Below mentioned are three case study scenarios. You are required to identify the most suitable communication network **for any one.** Explain the details of its Architecture, technicalities and Justification for the suitability with its advantages. A. *ABC Manufacturing, a leading automotive components producer, aimed to optimize their production processes by leveraging Industry 4.0 technologies. Facing challenges with equipment downtime and maintenance inefficiencies, they sought to implement predictive maintenance strategies to minimize disruptions and enhance overall operational efficiency. They needed a solution to unify communication across diverse machinery and sensors while ensuring compatibility with existing system* *B. In a remote region with limited access to healthcare services, Regional Health Services (RHS) aimed to overcome geographical barriers to provide quality medical assistance to underserved communities. The challenge lay in establishing a robust communication infrastructure to connect remote clinics with centralized healthcare facilities for consultations and diagnostics. RHS faced difficulties in establishing reliable communication links between remote clinics and central hospitals due to the absence of terrestrial network infrastructure* *C. XYZ Logistics, a large-scale warehouse management company, faced operational challenges related to inventory tracking, order fulfillment, and staff coordination within their expansive warehouse facilities. Seeking to improve efficiency and reduce errors in their logistics operations, they explored innovative communication solutions. XYZ Logistics struggled with the limitations of traditional communication systems, such as Wi-Fi, which encountered interference and signal disruptions due to the warehouse's layout and metallic infrastructure. This hindered real-time inventory tracking, picking accuracy, and communication between personnel.*	**5**	4-1,2,3,7,8-3,4,6,9,10,11,12	5
10	Compare and contrast any four major design criteria for sustainable working of the Network Layer.	**2**	3-1,2,3-3,4,6,9,10,11	4
11	When devising a novel feature, like a sophisticated autonomous driving system or an integrated vehicle-to-infrastructure (V2I) connectivity solution, which communication network would efficiently support data exchange among diverse vehicle components while ensuring real-time responsiveness and scalability. Explain the following of the chosen network.	**4**	3-1,2,3,7,8-3,4,6,9,10,11,12	5

	1. Basic Architecture 2. Data Frame Architecture 3. Process of Detecting errors			
12	Consider the scenario Customer 1: (-1-1-1+1+1-1+1+1) Customer 2: (-1-1+1-1+1+1+1-1) Message 1: Customer 1 + Customer 2 Message 2: Customer 1 + $\overline{\text{Customer 2}}$ Evaluate the cases and showcase the calculations.	**4**	2-1,2,3-3,4,6,9,10,11	5
13	Distinguish between IPv4 and IPv6 packets.	**2**	3-1,2,3,5-3,4,6,9,10,11	4
14	Consider the case given in Fig Q14, it shows the three-channel input scheme with single media to transmit the packets (Packet Schedule). With briefly mentioning the mechanism of weighted fair queueing, Plan the process and fill in the finish time, the output order for the following packets with showing the calculations for the same.  Fig Q14	**4**	2-1,2,3-3,4,6,9,10,11	6
15	In a scenario where a multinational corporation is undergoing a digital transformation, integrating various IoT devices across a plant. These devices transfer measured data to a centralized server using single media asynchronously. There are few devices which produce and transmit more and few seldomly do. The current employed Media Access Control (MAC) is by Token Passing Technique, which is simple but isn't efficient. You are a founder of a smart communication company and identified to consult on this issue. Discuss the Inefficiencies of the current systems and provide two best choices (comprehensively) for MAC which will suit the current situation.	**4**	2-1,2,3,-3,4,6,9,10,11	6

Packets	Arrival time	Length	Finish time	Output Order
A	0	8		
B	5	6		
C	5	10		
D	8	9		
E	8	8		
F	10	6		
G	11	10		
H	20	8		