

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: M.Tech
BRANCH: ECE**

**SEMESTER : 1st
SESSION : MO/2025**

SUBJECT: EC503 COMMUNICATION SYSTEMS AND NETWORKS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q.1(a)	Explain the major challenges of wired and wireless communication. Compare Bluetooth, Zigbee and UWB communications.	[5] 1	2
Q.1(b)	Draw the basic block diagram of a satellite communication system. How does the trilateration process help in estimating the location of a place?	[5] 1	3
Q.2(a)	How can a network engineer decide the number of cells in a cluster? Discuss the various ways by which you can enhance cellular system capacity.	[5] 2	2
Q.2(b)	Determine the cluster size, N that should be used for the maximum capacity assuming the path loss exponents $n=3$. The signal-to-interference ratio of 18dB is the minimum required for the satisfactory forward channel performance of a cellular system. There are six co-channel cells in the first tier, and all of them are at the same distance from the mobile.	[5] 2	4
Q.3(a)	Explain GPRS Architecture how it is different from GSM. What modification is required to convert it to EDGE Technology. Compare EDGE with UMTS.	[5] 3	3
Q.3(b)	Explain the principle of ALOHA and Slotted ALOHA. Discuss their vulnerability period & compare the performance of Pure ALOHA and Slotted ALOHA.	[5] 3	2
Q.4(a)	Describe the components of Cognitive Radio System? Explain Cognitive Radio Cycle in detail.	[5] 4	3
Q.4(b)	Explain the advantage of orthogonal frequency division multiplexing system used in combination with multiple input multiple output system? Also draw the block diagram of the combined system and explain.	[5] 4	4
Q.5(a)	Compare an infrastructure based wireless network with an infrastructure less wireless network and provide suitable examples. Discuss the major design challenges in Ad-hoc wireless networks.	[5] 5	3
Q.5(b)	Explain 'fragmentation' in IPv4. Compare IPv4 and IPv6 packet header.	[5] 5	2

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