VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - 1
WINTER SEMESTER 2024-2025

SLOT: B2

Programme Name & Branch	: B. Tech and BECE/BML
Course Code and Course Name	: BECE317L and Wireless and Mobile Communications
Faculty Name(s)	: Dr. Abhijit Bhowmick, Dr. Rajkishor Kumar, Dr. Hemanta Kumar Sahu, Dr. Tangudu Ramji, Dr. Sudhanshu Arya
Class Number(s)	: VL2024250500682/ 0685/ 0687/ 4709/ 2938
Date of Examination	: 28/01/2025
Exam Duration	: 90 minutes
General instruction(s):	Maximum Marks: 50

- Answer all questions and assume suitable values for any missing variables.
- Erlang B, Erlang C, Q Tables, and Okumura charts are permitted.

Q. No	Question	M
1.	a) What is the significance of frequency reuse in the context of a cellular system? Explain in detail with an example. b) Explain the practical handoff approach that efficiently handles both high-speed and low- speed users in an urban environment.	10
2.	In a cellular system, the signal-to-interference ratio (S/I) required for satisfactory forward channel performance is 18 dB. Calculate the S/I for a cluster size of 7 if the path loss exponent is: i. $n = 4$ ii. $n = 3$ iii. Given that each co-channel cell in the first tier contributes 0.000159 mW of interference power, what would be the minimum received power from the serving base station to achieve the stated S/I? Assume there are 6 co-channel cells in the fist tier, all equidistance from the mobile user. If the calculated S/I does not meet the required threshold, suggest an alternative cluster size.	10
3.	A wireless communication system is designed with 20 channels. The blocking probability is 0.01 (1%). i. Calculate the offered traffic capacity in Erlangs using the Erlang B formula. ii. If the offered traffic increases by 20%, how many additional channels are needed to maintain the same blocking probability? iii. Comment on the differences in trunking efficiency between the two scenarios mentioned above.	1
4.	Figure 1 shows the power delay profile of multi-path channels in a cell. i. Calculate the mean excess delay and rms delay spread for the given multipath profile. ii. Find the type of fading if the modulated symbol duration is 5 μs. iii. Estimate the 50% coherence bandwidth of the channel.	

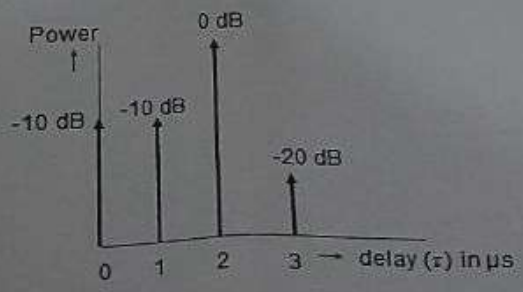

Figure 1: Power delay profile

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SLOT: B2 + TB2

5.	Determine the propagation path loss for a radio signal at 800 MHz, with a transmitting antenna height of 30 m and a receiving antenna height of 2 m, over a distance of 10 km in a dense urban mobile environment, using Hata propagation model. How comparable is Hata propagation path loss to free space propagation path loss, which is 130 dB for the above system parameters?	10