Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2020

Course: Wireless Communications **Semester: VIII**
Program: B Tech Electronics Engineering **Time 03 hrs.**
Course Code: ELEG422 **Max. Marks: 100**

Instructions:

- Attempt all questions as per the instruction.
- Assume any data if required and indicate the same clearly.
- Unless otherwise indicated symbols and notations have their usual meanings.
- Strike off all unused blank pages

SECTION – A (30 Marks)

Q 1 to Q 10 each one carries 1 Mark and

Q 11 to Q 20 each one carries 2 marks

1. In a dynamic channel assignment strategy
   (a) Voice channels are not permanently assignment
   (b) The serving base station request for a channel from MSC
   (c) MSC allocates the channel according to the predetermined algorithm
   (d) all of these
2. SDMA are realized by
   (a) adaptive arrays (b) fixed arrays
   (c) parabolic arrays (d) (a) and (b)
3. Interference is more severe in rural areas. State whether True or False.
4. Handoff does not require voice and control channel to be allocated to channels associated with the new base station. State whether True or False
5. Which of the following increases the number of base stations in order to increase capacity?
   (a) Cell splitting (b) Sectoring
   (c) Repeaters (d) Micro cell zone concept
6. The free space model predicts that received signal decays as a function of _____
   (a) Gain of transmitter antenna (b) T-R separation
   (c) Power of transmitter antenna (d) Effective aperture of the antenna
7. _____ controls the adaptive algorithm in an equalizer.
   (a) Error signal (b) Transmitted signal
   (c) Received signal (d) Channel impulse response
8. _____ is used to prevent deep fade for rapidly varying channel.
   (a) Modulation
   (b) Demodulation

(c) Macroscopic diversity technique
(d) Microscopic diversity technique

9. A RAKE receiver collects the _____-versions of the original signal.
   (a) Time shifted (b) Amplitude shifted
   (c) Frequency shifted (d) Phase shifted
10. Frequency hopping involves a periodic change of transmission _____
    (a) Signal (b) Frequency
    (c) Phase (d) Amplitude
11. What is the chip rate of W-CDMA?
    (a) 1.2288 Mcps (b) 3.84 Mcps (c) 270.833 Ksps (d) 100 Mcps
12. The total available channels if a total of 33 MHz of bandwidth is allocated to a cellular system which uses two 25 kHz simplex channels to provide full duplex voice and control channels is _____
    (a) 600 channels (b) 630 channels (c) 660 channels (d) 690 channels
13. Co-channel interference can be reduced by
    (a) decreasing D/R (b) increasing co-channel interference ratio, Q
    (c) reducing number of channels (d) increasing cluster size (N)
14. _____ refers to the phenomenon by which multiple copies of a transmitted signal are received at the receiver, due to the presence of multiple radio paths.
15. CDMA code (i.e., pseudo-sequence) converts a _____signal to a noise_____like signal.
    (a) narrowband to wideband (b) wideband to narrowband
    (c) wideband to wideband (d) narrowband to narrowband
16. The best channel utilization with the pure ALOHA protocol is
    (a)18.4 % (b) 36.8 %
    (c) 73.6 % (d) none of these
17. What is the time duration of a bit if data is transmitted at 270.833 kbps in the channel?
    (a) 270.833 s (b) 3 μs
    (c) 3.692 μs (d) 3.692 s
18. In US AMPS, 416 channels are allocated to various operators with 10 kHz guard band and channel between them is 30 kHz. What is the spectrum allocation given to each operator?
    (a) 12.5 kHz (b) 30 kHz (c) 12.5 MHz (d) 30 MHz
19. The overall handoff delay in mobile-assisted handoff algorithm is typically
    (a) 5–10 s (b) 1 s (c) 2–3 s (d) less than 1 s
20. How does HSCSD differs from the GSM to obtain higher speed data rate?
    (a) By allowing single user to use one specific time slot
    (b) By allowing single user to use consecutive user time slots
    (c) By using 8-PSK modulation technique
    (d) By allowing multiple users to use individual time slot

SECTION – B (50 Marks)

21. What is the need of equalization? Write the fundamental concept of equalization. [6M]
22. What are different types channels used in GSM? Explain them. [10M]
23. Explain the following multiple access techniques: spread spectrum multiple access (SSMA) and ALOHA. [10M]
24. Write the comparison between the macroscopic and microscopic diversity techniques. [6M]
25. Briefly describe the technical features of the following wireless network standards: EDGE, 3G-WCDMA, 4G-LTE [10M]
26. Discuss the basic concept of orthogonal frequency division multiplexing (OFDM). Also mention the advantages and disadvantages of OFDM [8M]

SECTION – C (20 Marks)

27. We consider a cellular system in which the total available voice channels to handle the traffic are 1,200. The area of each cell is 9 km^2 and the total coverage area of the system is 3,600 km^2.
    (a). Calculate the *system capacity* if the cluster size, *N* is 4.
    (b). Calculate the system capacity if the cluster size is 7. Does decreasing the reuse factor *N*, increases the system capacity? Explain.
    (c). How many times should a cluster of size 7 be replicated to cover the entire cellular area? [9M]
28. Assuming the speed of a vehicle to be equal to 60 m/hr, carrier frequency, f_c = 860 MHz, and rms delay spread σ_τ = 2 μs, calculate coherence time and coherence bandwidth. At a coded symbol rate of 19.2 Kbps what kind of symbol distortion will be experienced? What type of fading will be experienced by the channel? [6M]
29. Assuming four branch diversity is used, where each branch receives an independent Rayleigh fading signal. If the *average SNR* is 20 dB, determine the probability that the *SNR will drop below* 10 dB. Compare this with the case of a single receiver without diversity. [5M]