

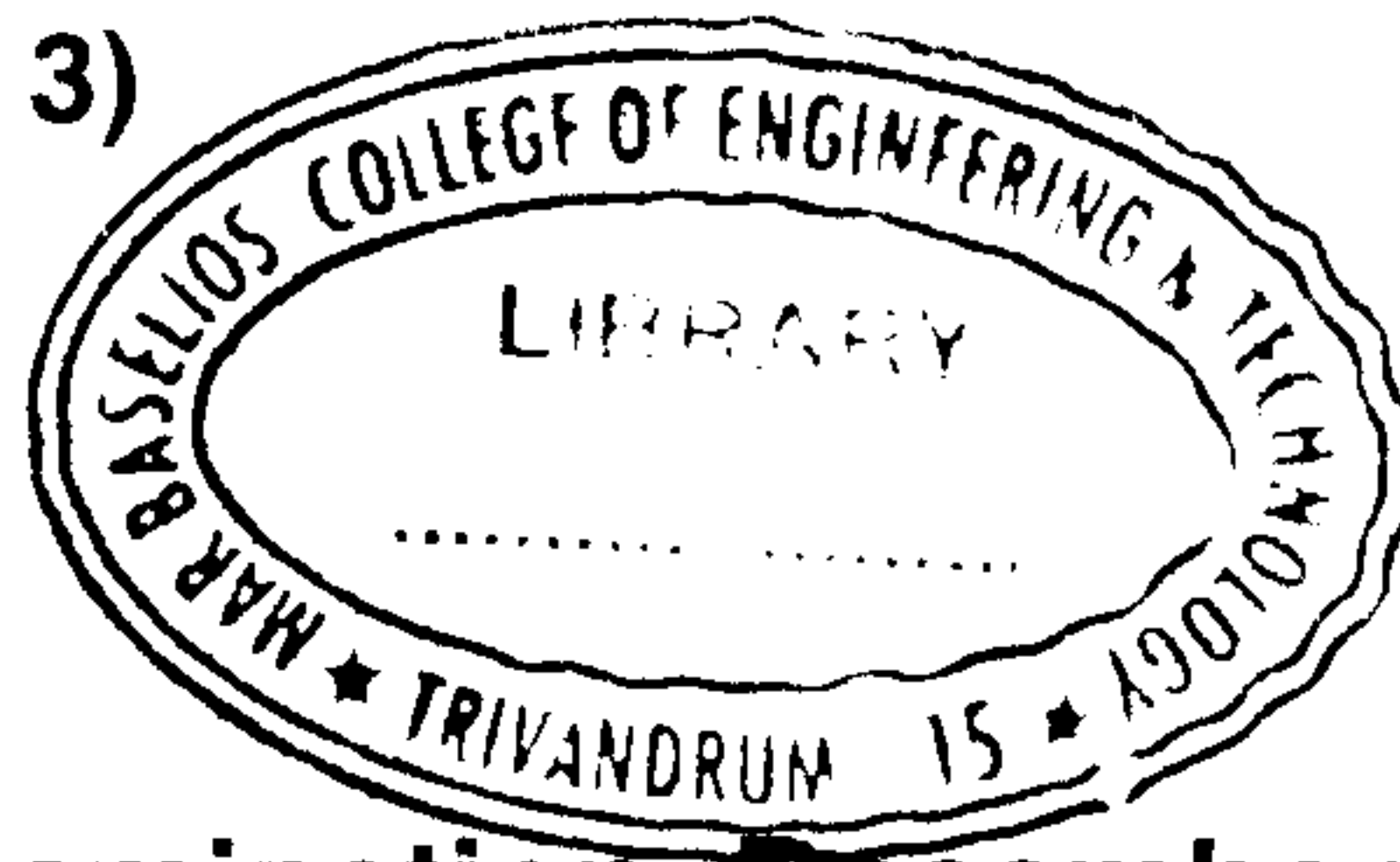


(Pages : 3)

F – 2922

Reg. No. :

Name :



**Eighth Semester B.Tech. Degree Examination, December 2018
(2013 Scheme)**

13.804 : WIRELESS COMMUNICATIONS (T)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions :

(10×2=20 Marks)

1. Explain working of Bluetooth.
2. Write the difference between wireless in local loop and wireless local area network.
3. Both GSM and DECT use GMSK, but with different Gaussian filters (BGT = 0.3 in GSM, BGT = 0.5 in DECT). What are the advantages of having a larger bandwidth time product ?
4. Consider a channel with three taps that are Nakagami-m-fading, and have mean powers 0.6, 0.3, 0.1 and m-factors of 5, 2 and 1. What is the diversity order - i.e., the slope of the BER versus SNR curves at high SNRs - when maximum ratio combining is applied ?
5. What are the techniques used to improve the received signal quality ?
6. Explain the difference between fixed channel assignment strategy and dynamic channel assignment strategy.
7. Explain hard and soft handoff in brief.
8. Write various advantages of spread spectrum.
9. Write various advantages of geo-stationary satellite.
10. What are the various features of TDMA ?

P.T.O.



PART – B

Answer **any one** question from **each** Module. **Each** question carries **20** marks.

Module – 1

11. a) Explain the various features of first, second, third and fourth generation cellular networks. **10**
- b) Explain evolution of mobile radio communication. **5**
- c) Explain paging system. **5**
12. Explain architecture and spectral allocation of WiMAX technologies. Also write various advantages and disadvantages of WiMAX technologies. **20**

Module – 2

13. a) Consider a mobile radio system using MSK with a bit rate of 100 kbit/s. The system is used for transmitting IP packets of up to 1,000 bytes. The packet error rate must not exceed 10^{-3} (without the use of an ARQ scheme). Determine the maximum allowed average delay spread of the mobile radio channel. **10**
- b) Explain trunking and grade of service as applicable to cellular communication system. **10**
14. a) What are various types of interferences encountered in Cellular System ? How can they reduce ? **5**
- b) Why Hexagon shape is chosen for a cell ? Explain. **5**
- c) Explain various methods of increasing the coverage and channel handling capacity of Cellular Communication System. **10**

Module – 3

15. When communicating with a geostationary satellite from earth, the distance between TX and RX is approximately 35,000 km. Assume that Friis' law for free-space loss is applicable (ignore any effects from the atmosphere) and that stations have parabolic antennas with gains 60 dB (earth) and 20 dB (satellite), respectively, at the 11-GHz carrier frequency used. **20**
- i) Draw the link budget between transmitted power P_{TX} and received power P_{RX} .
- ii) If the satellite RX requires a minimum received power of -120 dBm, what transmit power is required at the earth station antenna ?



16. Consider a receiver implementing microscopic diversity using two antennas. Let the envelope of the signals received by the two antennas at a given time instant be r_1 and r_2 . Assume the noise at the antennas is uncorrelated and has the same power N . What is the instantaneous SNR for this time instant at the output of the diversity combiner for selection diversity, equal gain combining and maximum ratio combining respectively for the following cases :
- i) $r_1 = r_2 = r$
 - ii) $r_1 \leq r_2 = r$

Assume that $u(t)$, the baseband equivalent transmitted signal, is one or the duration of transmission (this also means that $P_t = 1$). 20

Module – 4

17. a) Explain space code division multiple access with neat diagram. 10
- b) A CDMA system with processing gain 100 uses random signatures in the uplink. Assuming equal received power levels for all users and unit AWGN variance, what level of received signal power is needed if a BER level of 0.001 is necessary if :
- i) there are no interferers
 - ii) there are 10 interferers. 10
18. a) Consider an OFDM system with coding across the tones, where the code is a block code with Hamming distance $d_H = 7$. If all tones that carry bits of this code fade independently, what is the diversity order that can be achieved ? 10
- b) Sketch block diagram of earth station transmitter and receiver. Explain in brief. 5
- c) Explain satellite transponder. 5

