

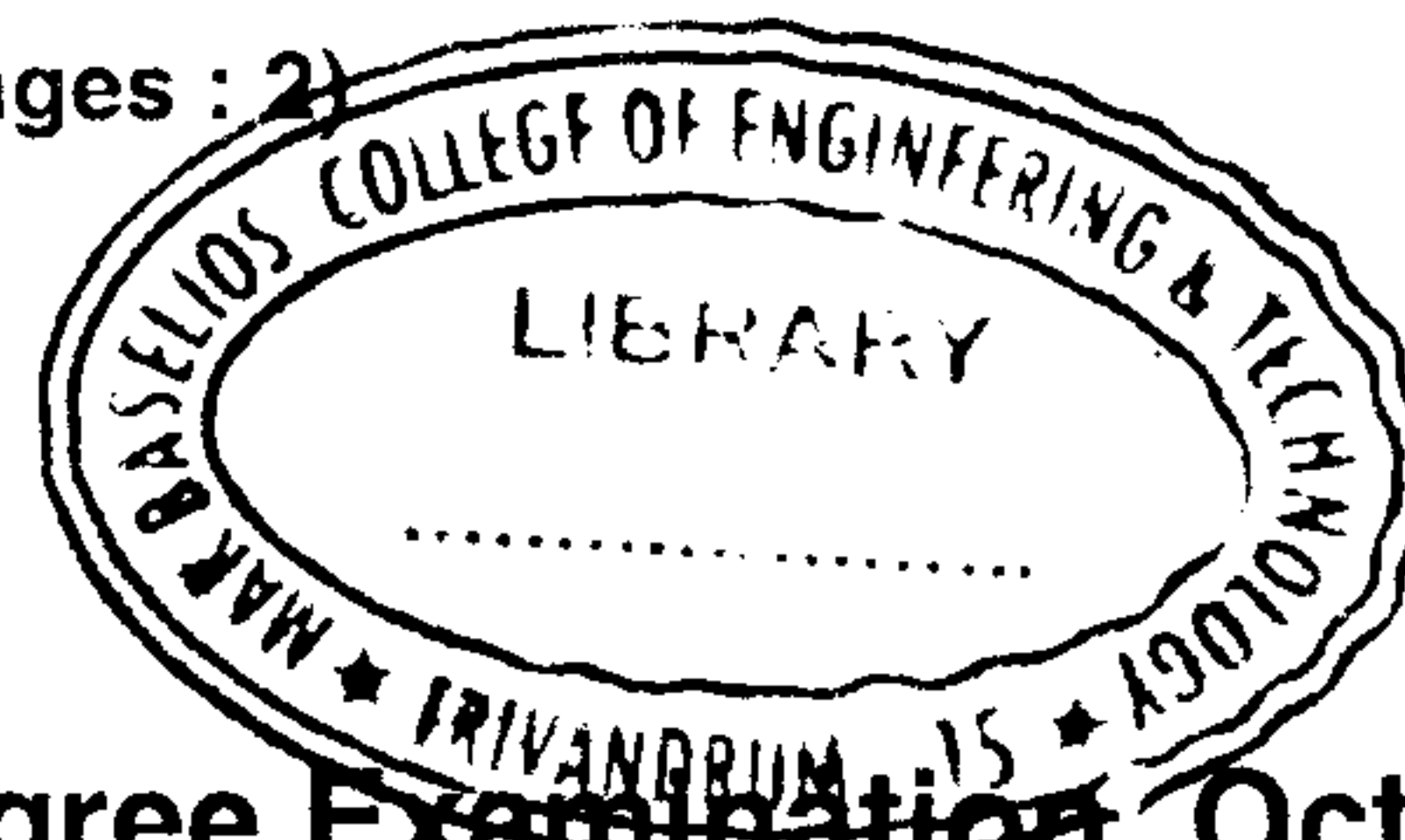


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E – 5555

Reg. No. :

Name :



**Eighth Semester B.Tech. Degree Examination, October 2018
(2008 Scheme)**

08.804 : SATELLITE AND MOBILE COMMUNICATION (T)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **4** marks.

1. Differentiate payload and transponder.
2. Define sidereal day. What is sidereal time ?
3. Define apogee and perigee. If the apogee and perigee of a satellite moving in an orbit is 30,000 km and 1000 km respectively. Determine the major axis and minor axis if eccentricity is 0.78.
4. What are the various interferences that may affect the satellite link performance ? Explain how these interferences effects are taken into account in the satellite link design.
5. Explain the various steps involved in the hand-off process.
6. Describe cell splitting. What is its advantage ? Determine the ratio of transmit powers of a larger and smaller cell when the received powers are equal and S/I are the same, when the smaller cell has half the radius of larger cell.
7. Differentiate co-channel interference and adjacent channel interference. Define co-channel reuse ratio. What is the reuse ratio when cluster size is 12 ?
8. Define co-antenna interference CAI. Illustrate effect of CAI on eyediagram for one receiving antenna and different number of transmitting antenna (N = 1, N = 2, N = 4) using BPSK.
9. Give an example of F & C code used in CDMA. What advantages does it provide to the system ?
10. What is the implication of a channel described by frequency-flat, slowly fading Rayleigh channel? **(10×4=40 Marks)**

PART – B

Answer **any two** questions from **each** Module. **Each** question carries **10** marks.

Module – I

11. a) Derive the expression of C/N of satellite link.
b) In a link budget calculation at 12 GHz, the free space loss is 206 dB, the antenna pointing loss is 1 dB, the atmospheric absorption is 2 dB, the receiver G/T is 19.5 dB/k and the receiver feeder losses are 1 dB. The EIRP is 48 dBW. Calculate the carrier to noise spectral density ratio.

P.T.O.



12. a) Describe the satellite stabilisation techniques.
b) Explain the telemetry, tracking and command subsystem with reference to an earth station. Are they a part of space segment or earth segment ?
13. a) Why the low noise amplifiers in a satellite receiving system placed at the antenna end of the feeder cable ?
b) Explain a cassegrain antenna. Why they are preferred for large earth station ?
c) Calculate the gain of a 6 m paraboloidal antenna operating at a frequency of 14 GHz. Assume an aperture efficiency of 0.75.

Module – 2

14. a) Obtain the expression for signal to interference ratio in a cell.
b) If S/I ratio of 15 dB is required for satisfactory forward channel performance of a cellular system, what is the frequency reuse factor and cluster size that should be used for maximum capacity if the path loss exponent is $n = 4$. Let the number of channel cells in the first tier is 6.
15. Explain the Longely-Rice model. State its advantages.
16. a) Explain the GSM operation from speech input to speech output.
b) Discuss the GSM frame structures.

Module – 3

17. Differentiate transmitter diversity and receiver diversity. Define MIMO channels. What type of diversity does this provide ? Explain with the help of block diagram.
18. a) Derive the expression of signal to interference ratio of a cellular network that uses CDMA.
b) Illustrate the application of a spreading sequence of length four to a data sequences. Also draw the spectrum of data signal and spreading signal.
19. a) Explain any one type of spreading code used in direct sequence modulation.
b) Let bits are transmitted by two users such that the received signal is $\hat{r}(t) = b_1 g_1(t) + b_2 g_2(t)$. Show that the signal $\hat{r}(t)$ provided by the user 1's receiver get the signal transmitted by first transmitter in a conventional CDMA receiver. What is the condition for the spreading code used in CDMA ?

(6×10=60 Marks)

