urse Code: EC 615
urse Name: Mobile Communications
ll Marks: 50
ration of Examination: 3 hours

Answer any ten questions.

Q.No.		Marks
1	Explain the relative merits and demerits of large and small cluster sizes in cellular systems. Find the appropriate cluster size for a cellular system if S/I requirement is 15 dB. Assume n=3.	5
2	A satellite link is established between an earth station and a satellite transponder for the RF frequency of 4 GHz. For the earth station transmitter, the transmitted power is 1 kW, and the transmitter and receiver antenna gains are Q dB. The free space distance is 30 km. Find the received power at the transponder.	5
3	A vehicle receives a 910 MHz transmission while travelling at a constant velocity for 15 s. The average fade duration for a Rayleigh fading signal level 10 dB below the RMS level is 1 ms. How far does the vehicle travel during 15 s time duration? Assume that the local mean remains constant during travel.	5
4	Compare M-ary PSK, M-ary FSK and M-QAM modulation schemes.	5
5	A DSSS system has a 1.2288 Mcps code clock rate and a 9.6 kbps information rate. Calculate the processing gain in dB. How much improvement in information rate is achieved if the code generation rate is changed to 5 Mcps and the processing gain to 256.	5
6	Differentiate fast hopping and slow hopping. It is proposed to transmit a bit sequence 100110100101. Show the transmit signal for slow and fast hopping. In slow hopping the signal parameter remains constant for 2 bits and for fast hopping the signal changes 3 times per bit/ symbol.	5
7	What is the use of pulse-shaping filters? Design a Gaussian pulse shaping filter with BT = 0.5 for a symbol rate of 19.2 kbps. Write expressions for the frequency response and impulse response of the filter and plot them.	5

List the algorithms for adaptive equalization and explain the RLS algorithm. 5

Derive an expression and show that average SNR is improved· in a MRC diversity scheme. 5

Explain the use of bit interleaving used in wireless communications? 5

A (15,5) cyclic code has a generator polynomial as follows: 5

$$g(X)= 1 + X + X^2 + X^5 + X^8 + X^{10}$$

(i)   Draw a diagram for an encoder for this code.
(ii)   Find the code polynomial for the message $m(X) = 1 + X^2 + X^4$

Compare the performances of various random access schemes used in mobile communication. 5