SEMESTER 2 EXAMINATIONS, SESSION 2021 - 2022

for the Degree of

Bachelor of Engineering

Date: 31st March 2022   Time: 12:00 – 1:15 pm

TF-4304 Mobile and Wireless Network Systems

Time allowed: One hour fifteen minutes

Instructions to candidates:

Answer **ALL** questions.

Two questions carry 15 and 15 marks respectively.

The paper has 2 pages including this cover.

Please write your name and registration number on the paper.

Q1 An FHSS system employs a band of 2.4 – 2.4835 GHz and an individual channel bandwidth of 1 MHz.

Step1: What is the minimum number of PN bits required for each frequency hop?

Step2: Generate a 64-bit pseudo noise (PN) sequence, P_0, P_1, ..., P_{63}. The sequence is defined by the equation $P(X) = 1 + X^2 + X^3 + X^5$. Implement with a 6-bit linear feedback shift register. The seed value for the PN sequence is 100000.

Step3: Take LAP, 24-bit MAC address of the device and append it with 7-bit barker sequence.

Step4: Take the bitwise XOR of P_{34}, P_{35}, ..., P_{63} with the sequence produced in **step 3**.

What is the advantage of using Barker Sequence and XOR of PN sequence with LAP of the device?

Q1.   Bandwidth – 2.4 GHz

Step 1

Individual bandwidth – 100 Hz

Total no. of included channel : Ws/F_s

$= \dfrac{2.4 \times 10^9}{100}$

$= 24 \times 10^6$ 4

Min no. of PN bits

$= \log_2 (24 \times 10^6)$

$= 24.51 \ldots$

$\neq 25$ ✗

$\dfrac{2.4 + 2.4835}{2} = 2.44175 \text{ GHz}$

$= Ws/F_d$

$= \dfrac{2.44175 \times 10^9}{1 \times 10^6}$

$= 2441.75$

Min no. of PN bits $= \log_2 (2441.75)$

$= 11 \text{ bits}$ ✗

PN sequence is 100000

X^5		X^3	X^2	1	1	P(X)
1	0	0	0	0	0	0
0	1	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	1	0	0	0
1	1	1	0	1	0	0
1	1	1	1	0	1	1
0	1	1	1	1	0	0
1	0	1	1	1	1	1
0	0	1	0	1	1	1
0	0	0	1	0	1	1
0	0	0	0	1	0	1	1

Step 3:   10000

                        MBB - 1
                        [   ]

                Baker Sequence (+ + + - - + -)

Step 4 :

Advantage   - Robust
   Their robustness against interference
            and their insensitivity to multipath
                propagation.

[15 marks]

Q2   Mr Alif is Network Administrator and has set up a Wireless Network. He has device S and wants to communicate with Ms Velier Dhoni having device D. The well-known protocols namely DSDV, DSR, and AODV are configured in devices as Wireless Router. I ask to

(i) write routing tables of named protocols which will be formed when Mr Alif trigger the device to initiate the connection.
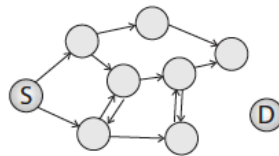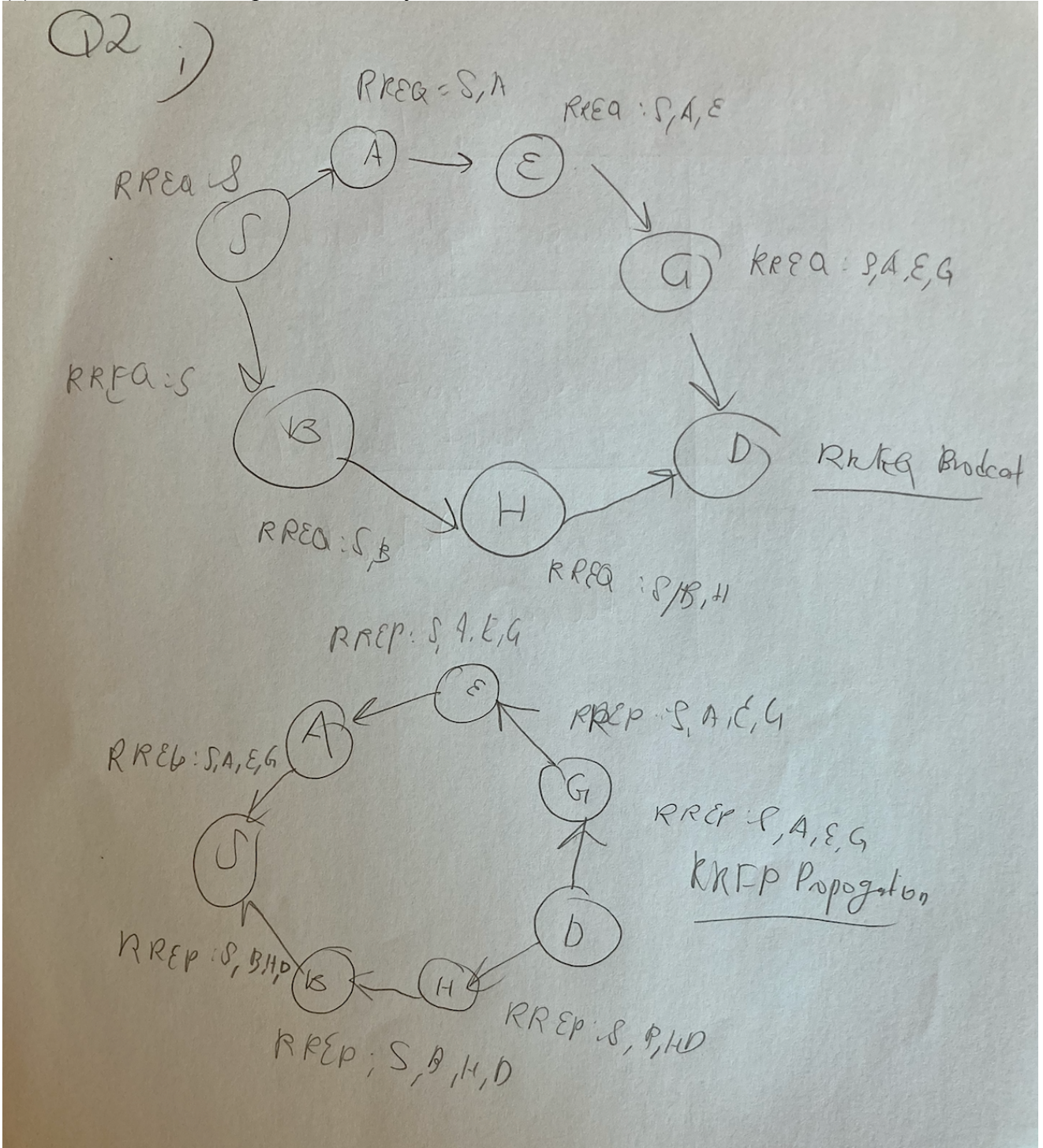

(ii) show routing tables when some intermediate devices have already connected to Ms Velier's device
(iii) show routing tables when any intermediate device in the network moves out
(iv) compare routing tables keeping the view of design goals of routing protocols.

(v) name all the control packets used by the devices.

Q2 i)

RREQ = S,A

RREQ : S,A,E

RREQ S

RREA : S,A,E,G

RREQ : S

RRFA : S

RREQ : S,B

RREQ : S,B,H

RREQ Brodcat

RREP : S, A, E, G

RREP : S, A, E, G

RREb : S,A,E,G

RREP : P,A,E,G

RREP Propogation

RREP : S, B,H,D

RREP : S, B,H,D

RREP ; S, B,H,D

iv)

RREQ	Route Request Message
RREP	Route Reply Message
RERR	Route Error Containing a list of Invalid Destinations
RREP	RREP Acknowlegment Message

[15 marks]

END