

Name:
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Software Defined Radio
Program: B.Tech (EE-BCT)
Course Code: ELEG 438

Semester: VII
Time 03 hrs.
Max. Marks: 100

Instructions: Attempt ALL Questions

SECTION A

S. No.		Marks	CO
Q 1	Explain Harvard memory architecture	05	CO1
Q2.	Deduce the butterfly matrix for 4-element linear array and draw the circuit diagram for the realization.	05	CO5
Q3.	Explain Quantization noise and SNR in SDR.	05	CO2
Q4.	Calculate Baseband data Rate for UMTS with oversampling rate of 4X, having sample size of 16 bits with chip rate of 3.84×10^6 . Assume system has I & Q channels.	05	CO2

SECTION B

Q 5	Explain Receiver requirements of SDR and with neat sketch explain the working of Feed forward amplifier.	10	CO2
Q6	Design the IIR and FIR filter for order 4 used in SDR for realizing frequency conversion. How the structure gets modified for Halfband filter and CIC filter with P=3.	10	CO4
Q7.	With neat sketch of block diagram, explain the working of HDR with multiple transmitter and receiver chains.	10	CO1
Q8.	Explain in detail with the suitable block diagram, the architecture of DSP devices used in SDR (TMS320C64, TMS320C6416 and TMS320C5509).	10	CO4

SECTION-C

Q 9	RF Communication link has to be established between the transmitter and the receiver operating at 6 GHz located at a distance of 2500 kms. If the transmitter power is 2 watts, find the received power if the cable losses are 1.5 dB each, antenna gain is 25 dB each, insertion loss of the filter is 0.5 dB each and the conversion loss of 10 dB each, gain of the amplifier (power amplifier) =15 dB and noise figure of 1.3 with the gain of 17dB. Calculate the RF system performance in terms of SNR both at transmit and receive sides. How the system performance will get modified if other diffraction losses are considered taking into account of the following parameters	20	CO3
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	Horizontal distance b/w the mobile and diffraction edge =5 m, difference between mean building height and mobile antenna height =10 m with the average separation between the rows of buildings is 20 m.		
Q10.	<p>a. Linear Antenna array with 3 elements is directed to receive the desired angle at 30 deg but also receives the interfering signals at -60 deg and 60 deg. Find the weights of the array so that final main beam produces maximum directivity in 0 deg direction and null intensity at interfering angles.</p> <p>b). How the weights will be modified if we apply MUSIC DOA algorithm.</p>	20	CO5