University of Mumbai
QUTION BANK

Examination: BE Semester VIII

Course Code: ECC801 and Course Name: RF Design

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The constant image impedance is obtained using
Option A:	Constant K T sections
Option B:	Constant K Pi sections
Option C:	m-derived T sections
Option D:	m-derived Pi sections
2.	The stability factors, μ1 for transistor1 is 1.25 and μ2 of transistor2 is 1.9.
Option A:	Transistor 1 is unstable
Option B:	Transistor 2 is unstable
Option C:	Transistor 1 is more stable than transistor 2
Option D:	Transistor 2 is more stable than transistor 1
3.	In the single stub tuning network, the length of the short circuited stub is 0.095λ. What length of stub would be required if it would be an open circuited stub?
Option A:	0.095λ
Option B:	0.345λ
Option C:	0.155λ
Option D:	Zero
4.	For the Maximally flat filter, for cutoff frequency of 2 GHz, impedance of 50, and at least 15 dB insertion loss at 3 GHz, What is the order of the filter?
Option A:	3
Option B:	4
Option C:	5
Option D:	7
5.	The Intermodulation distortion in diode ring mixers can be reduced
Option A:	By using resistance in parallel to each diode
Option B:	By using resistance in series to each diode
Option C:	By removing resistance from mixer circuits
Option D:	by using more number of diodes
6.	In PLL based synthesizers, coarse steering signal is generated to
Option A:	Reduce frequency
Option B:	Reduce response time
Option C:	to reduce bandwidth
Option D:	to reduce frequency resolution
7.	The speed of DAC converter
Option A:	Limits the high frequency performance of the synthesizer

Option B:	Limits the loop gain
Option C:	Limits the resolution
Option D:	does not affect frequency
8.	The grounded conductor for safety should have a resistance of
Option A:	100 Ω
Option B:	10Ω
Option C:	1Ω
Option D:	0.1 Ω
9.	Differential amplifiers are useful in EMI control as
Option A:	They have high input impedance
Option B:	They have high gain
Option C:	They have large common mode rejection Ratio
Option D:	They have limited bandwidth
10.	Apertures in metallic enclosure act like
Option A:	Paths for air passage from outside to inside
Option B:	Secondary antenna for radiating EMI signals
Option C:	Break in current flow paths
Option D:	Visual path for examining inside activity
11	The two methods of RF filter design are _____ .
Option A:	Image prototype method and insertion gain method
Option B:	Image prototype method and insertion loss method
Option C:	Image parameter method and insertion gain method
Option D:	Image parameter method and insertion loss method
12.	The two necessary and sufficient conditions for a transistor to be unconditionally stable are _____.
Option A:	$K > 1, \lvert\Delta\rvert > 1$
Option B:	$K > 1, \lvert\Delta\rvert < 1$
Option C:	$K < 1, \lvert\Delta\rvert > 1$
Option D:	$K < 1, \lvert\Delta\rvert < 1$
13.	One port negative resistance oscillator for steady state oscillation has _____.
Option A:	$\Gamma_L * \Gamma in = 1$
Option B:	$\Gamma_L / \Gamma in = 1$
Option C:	$\Gamma_L + \Gamma in = 1$
Option D:	$\Gamma_L - \Gamma in = 1$
14.	In Indirect frequency synthesizer, the output frequency f_0 is equal to _____.
Option A:	fr/N (fr is reference frequency)
Option B:	N*fr (fr is reference frequency)
Option C:	fr + N (fr is reference frequency)
Option D:	fr - N (fr is reference frequency)
15.	The mechanism that enables electromagnetic energy to be created in an electronic device and coupled to its AC power cord is known as _____.
Option A:	Radiated Emission (RE)

Option B:	Radiated Susceptibility (RS)
Option C:	Conducted Emission (CE)
Option D:	Conducted Susceptibility (CS)
16.	The outer surface of the shield has to be _____to avoid electromagnetic energy leakage through the shield.
Option A:	Covered with insulators
Option B:	Kept in open environment
Option C:	Placed in isolation
Option D:	Grounded
17.	The 'm' value of the terminating sections in composite filter is _____.
Option A:	0.12
Option B:	0.3
Option C:	0.6
Option D:	0.9
18.	If a transistor has the following S parameters $S_{11} = 0.5 < -90$, $S_{12} = 0$, $S_{21} = 2.0 < 30$, $S_{22} = 0.69 < -90$ What is the maximum unilateral gain (GTU max)?
Option A:	8 dB
Option B:	10 dB
Option C:	12 dB
Option D:	14 dB
19.	Practical diode mixers have a conversion loss between _____ in 1-10 GHz range.
Option A:	0 and 1 dB
Option B:	2 and 3 dB
Option C:	4 and 7 dB
Option D:	8 and 12 dB
20.	The size of an accumulator for a DDFS frequency range 0 to 10 kHz, frequency resolution of at least 0.001 Hz, and spectral purity of at least 40 dB is _____.
Option A:	32 bit
Option B:	26 bit
Option C:	16 bit
Option D:	12 bit

Q	
A	**Solve any Two** **5 marks each**
i.	What are Richards' Transformations? What should be the length of the stubs? Why?
ii.	List out and discuss the performance parameters of frequency synthesizers?
iii.	What are the various reflection coefficients, power levels and gains associated with two port RF amplifier circuits? Define all with a diagram.
B	**Solve any One** **10 marks each**

i.	The S parameters of a BJT at VCE =15 V and Ic = 15 mA at f=500 MHz are as follows. S11=0.761∠-151°, S12=0.025∠31°, S21=11.84∠102°, S22=0.429∠-35° Determine the stability using K-Δ test and μ test. If the transistor is potentially unstable, Draw the input and output stability circles and show the stable and unstable regions.
ii.	Design a third order, maximally flat lumped-element band pass filter having center frequency of 1 GHz, bandwidth is 10 % and impedance of 50 Ω.

N	g_1	g_2	g_3	g_4	g_5	g_6	g_7	g_8	g_9	g_{10}	g_{11}
1	2.0000	1.0000									
2	1.4142	1.4142	1.0000								
3	1.0000	2.0000	1.0000	1.0000							
4	0.7654	1.8478	1.8478	0.7654	1.0000						
5	0.6180	1.6180	2.0000	1.6180	0.6180	1.0000					
6	0.5176	1.4142	1.9318	1.9318	1.4142	0.5176	1.0000				
7	0.4450	1.2470	1.8019	2.0000	1.8019	1.2470	0.4450	1.0000			
8	0.3902	1.1111	1.6629	1.9615	1.9615	1.6629	1.1111	0.3902	1.0000		
9	0.3473	1.0000	1.5321	1.8794	2.0000	1.8794	1.5321	1.0000	0.3473	1.0000	
10	0.3129	0.9080	1.4142	1.7820	1.9754	1.9754	1.7820	1.4142	0.9080	0.3129	1.0000

Source: Reprinted from G. L. Matthaei, L. Young, and E. M. T. Jones, *Microwave Filters, Impedance-Matching Networks, and Coupling Structures* (Dedham, Mass.: Artech House, 1980) with permission.

Table: Element values for maximally flat low pass filter $g_0=1, \omega_c=1$, N=1 to 10

Q	
A	**Solve any Two** **5 marks each**
i.	What do we understand by 'characteristic - impedance' of a cable? How do we use this property of cables to reduce emissions and susceptibility?
ii.	Define shielding effectiveness. How can this be measured and the result expressed as?
iii.	Explain various performance parameters of Microwave Mixers.
B	**Solve any One** **10 marks each**
i.	Design a microwave oscillator at 2.75 GHz using a BJT in its common base configuration. S parameters of a transistor are as below

S_{11}	S_{21}	S_{12}	S_{22}
1.6733∠99.1	1.9755∠-138.68	0.6945∠94.71	1.13∠-101.3

ii.	Explain DDS frequency synthesizers and comment on methods of reducing switching time.
Q	
A	**Solve any Two** **5 marks each**
i.	Differentiate between frequency generator and frequency synthesizer. Give the classification of frequency synthesizers.
ii.	Compare various filter design methods?
iii.	Discuss the importance and method of quantification of communication system EM.
B	**Solve any One** **10 marks each**
i.	What is the phase noise in oscillators? How do we characterize it? What are the effects of phase noise.
ii.	A GaAs MESFET is having following S parameter

	Freq (GHz)	S11	S21	S12	S22
	3	0.8∠-90	2.8∠100	0	0.66∠-50
	4	0.75∠-120	2.5∠80	0	0.6∠-70
	5	0.71∠-140	2.3∠60	0	0.68∠-85
	Design an amplifier to operate at 4 GHz for a gain of 11 dB. Plot and use the constant gain circles for Gs = 2 dB and GL=1 dB to realize the gain.				

Q	**Solve any Four out of Six (5 marks each)**
A	Discuss the disadvantages of constant-k filter section and how are they overcome by an m-derived filter section?
B	Distinguish the two types of stability for a transistor amplifier.
C	A single-ended FET mixer is to be designed for a wireless local area network receiver operating at 2.4 GHz. The parameters of the FET are R_d = 300 Ω, R_i = 10 Ω, C_{gs} = 0.3 pF, and g_1 = 10 mS. Calculate the maximum possible conversion gain.
D	Describe in brief the different types of frequency synthesizers.
E	Explain the functions, working of LISNs and why we need different LISNs
F	Elaborate the need for EMC specifications, standards and measurements.

Q	
A	**Solve any Two (5 marks each)**
i.	Describe tests for unconditional stability used in RF amplifier design.
ii.	Explain in brief Oscillator Phase Noise.
iii.	Differentiate between radiated Common-Mode (CM) and Differential-Mode (DM) coupling with suitable example.
B	**Solve any One (10 marks each)**
i.	Design a composite low-pass filter by the image parameter method with the following specifications: R_0 = 50 Ω, f_c = 5.25 MHz and f∞ = 5.4 MHz. Draw the filter circuit indicating the designed parameters.
ii.	Explain the following mixer characteristics: Image frequency, Conversion loss, noise figure of SSB and DSB signal.

Q	**Solve any Two Questions out of Three (10 marks each)**
A	Implement a low-pass filter for fabrication using microstrip lines using Richards' Transformation and Kuroda's identities. The specifications include a cutoff frequency of 4 GHz, an impedance of 50 Ohm, and a third-order 3 dB equal-ripple passband response (g_1 = 3.3487, g_2 = 0.7117, g_3 = 3.3487, g_4 = 1.0000).

B	The S-parameters at 10 GHz for a microwave transistor with a 50 ohms reference impedance are: S_{11}= 0.5∠100°, S_{12}= 0.01∠-20°, S_{21}=2.0 ∠20° S_{22}=0.4∠-100° The source impedance is 25 ohms and the load impedance is 40 ohms. Calculate the power gain, the available power gain and the transducer power gain.
C	Explain the terms EMI and EMC. Describe the different sources of EMI in detail with examples.

Note: This is the sample Question bank. The questions from question bank may or may not be included in final examination.

University of Mumbai

Examinations Summer 2022

Sample Questions-Wireless Networks

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following protocols is more favorable for a wireless Ad hoc network environment?
Option A:	TDMA
Option B:	CDMA
Option C:	CSMA/CD
Option D:	CSMA/CA
2.	The basic function of router is _____
Option A:	To set the data rate
Option B:	To transfer the packets between the networks
Option C:	To offer the maximum speed
Option D:	To support the quality of service for multimedia applications
3.	A scatternet is a collection of _____
Option A:	One master and slave
Option B:	Only master
Option C:	Piconets
Option D:	Only slaves
4.	The technology that promises a potentially revolutionary approach to radio communication in WBANs is
Option A:	WiMAX
Option B:	UWB
Option C:	Bluetooth
Option D:	WiFi
5.	The access method of IEEE 802.15 is _____
Option A:	DSS-TDD-TDMA
Option B:	FHSS-FDD-FDMA
Option C:	FHSS-TDD-TDMA
Option D:	DSSS-FDD-FDMA
6.	The RTS and CTS frames in CSMA/CA ____ solve the hidden station problem. The RTS and CTS frames in CSMA/CA ____ solve the exposed station problem.
Option A:	Cannot; Cannot
Option B:	Can; Cannot
Option C:	Cannot; Can
Option D:	Can; Can
7.	Wireless wide area network uses which of the following techniques to connect to Internet
Option A:	only Wi-Fi
Option B:	only WiMAX
Option C:	only LMDS
Option D:	WiFi and LMDS

8.	To establish size of cellular network, network planner should know the
Option A:	Network topology and link capacity
Option B:	BSC sizing and MSC sizing
Option C:	Network Capacity
Option D:	Network topology, link capacity, BSC sizing and MSC sizing
9.	Which scheme/ strategy is suitable to establish the communication between the access point (AP) and the infrastructure of LANs?
Option A:	Wireless
Option B:	Wired
Option C:	Wireless & Wired
Option D:	Cannot Predict
10.	A sensor network is designed to collect information from a _____ environment.
Option A:	Logical
Option B:	Physical
Option C:	Logical & Physical both
Option D:	Logical or Physical
11	Which of the following is a measure of the rate at which radio frequency energy is absorbed by the body when exposed to radio frequency electromagnetic field?
Option A:	Data rate
Option B:	Frequency absorption rate
Option C:	Specific absorption rate
Option D:	Data absorption rate
12	According to the specifications, how many Bluetooth devices can actively participate in a small network, called piconet?
Option A:	2
Option B:	4
Option C:	6
Option D:	8
13	The ZigBee is a commercial standard developing the application on top of which of the following standards that define the PHY and the MAC layers:
Option A:	IEEE 802.15.4
Option B:	IEEE 802.11
Option C:	IEEE 802.16
Option D:	IEEE 802.3
14	UWB bandwidth is.
Option A:	7.5GHz
Option B:	5.5GHz
Option C:	6.5GHz
Option D:	8.5GHz
15	Packet binary convolutional coding (PBCC) is an optional coding scheme defined in_____
Option A:	IEEE 802.11a
Option B:	IEEE 802.11b
Option C:	IEEE 802.11n

Option D:	IEEE 802.11p
16	IEEE 802.16 supports data rate up to.
Option A:	54 Mbps
Option B:	100 Mbps
Option C:	134 Mbps
Option D:	150 Mbps
17	WMAN-OFDM PHY layer is the version of.
Option A:	12 point OFDM
Option B:	24 point OFDM
Option C:	125 point OFDM
Option D:	256 point OFDM
18	WiMAX uses licensed and unlicensed spectrum to deliver a.
Option A:	Point-to-point connection
Option B:	Point-to-multipoint connection
Option C:	Both P2P and P2MP
Option D:	None of these
19	In wireless ad-hoc network _____.
Option A:	Access point is not required
Option B:	Access point is must
Option C:	Nodes are not required
Option D:	All nodes are access points
20	Wireless sensor networks are used when _____
Option A:	Topology of the network does not change
Option B:	Topology of the network changes very frequently
Option C:	Sensor nodes are having unlimited power
Option D:	Having limited power

Option 1

Q2, Q3 and Q4 (20 Marks Each)	**Solve any Four out of Six** **5 marks each**
A	Describe the VANET network architecture.
B	Draw and explain wireless sensor node.
C	Explain WMAN network architecture.
D	Write a short note on Classification of wireless networks.
E	Define link types in Bluetooth.
F	Discuss issues in deploying the WLAN.

Option 2

Q2, Q3 and Q4 (20 Marks Each)	**Solve any Two Questions out of Three** **10 marks each**
A	Using the following data for GSM1800, develop downlink and uplink budgets and determine the cell radius Data : Base station transmit power (Pt) : 32 dBm Mobile station transmit power (Pm) : 24 dBm Mobile station noise figure : 7 dB Base station noise figure : 4 dB

	Base station transmit and receive antenna gain (GA) : 18 dBi Mobile antenna gain : 0 dBi Required signal-to-noise ratio (SNR) : 10 dB BS transmit antenna cable, connector and filter losses (Lc) : 5 dB BS receiver antenna cable, connector and filter losses (Lc) : 3 dB Orientation/body losses at mobile : 3 dB Shadow fading: 10.5 dB Thermal noise density: -174 dBm/Hz Antenna diversity gain at BS: 5 dB Note : 1) Consider diversity for uplink link budget 2) Consider Hata model for calculating cell radius
B	Explain various Bluetooth connection establishment states. Draw a complete flow diagram.
C	Write a short note on different routing protocols in wireless sensor networks.
D	Write short note on *i* IoT Architecture ii Machine to machine communication
E	Describe MANET architecture and hence explain MAC protocols in MANET.
F	Describe IEEE 802.11 architecture.
G	What are the architecture components of RFID? Explain types of tags in RFID.
H	Describe ZigBee topologies. List general characteristics of ZigBee.
I	Describe IEEE 802.11 equipment. Why is it preferable to use smaller packets in a WLAN environment?
J	What is a wireless mesh network (WMN)? Explain the characteristics of WMN.
K	Enumerate the three phases of the wireless network planning process. Explain each phase.
L	Explain link budget analysis and its requirement in wireless network. Estimate the average SINR of HSDPA when the maximum transmit power of DSCH is 5.5 W and total base station power is 18 W. Use α and *G as 0.2 and* 0.363, respectively.

Option 3

Q2, Q3 and Q4. (20 Marks Each)	
A	**Solve any Two** **5 marks each**
i.	Explain Zigbee network components and network topologies.
ii.	Compare infrastructure based and infrastructureless WLAN.
iii.	Explain with examples centralized and distributed schemes in localization of WSN nodes.
B	**Solve any One** **10 marks each**
i.	Explain link budget analysis requirements of wireless networks.
ii.	Explain 802.16 protocol architecture.

Note: This is the sample Question bank. The questions from question bank may or may not be included in final examination.

University of Mumbai

Examinations Summer 2022

Sample Questions-Optical Network

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	A local telephone network is an example of_____network.
Option A:	Packet switched
Option B:	Circuit switched
Option C:	Bit switched
Option D:	Line switched
2.	It is a passive device which allows the flow of optical signal power in only one direction and prevents reflections in the backward direction.
Option A:	Optical fiber connector
Option B:	Fiber splice
Option C:	Optical coupler
Option D:	Optical isolator
3.	In WDM systems crosstalk results in …….
Option A:	Power Penalty
Option B:	Transmission loss
Option C:	Connection loss
Option D:	Increase in BER.
4.	An OLT (Optical Line Terminal) _____multiple wavelengths into a single fiber and _____a set of wavelengths on a single fiber into separate fibers.
Option A:	Multiplexes, demultiplexes
Option B:	Adds, drops
Option C:	Accepts, rejects
Option D:	Passes, stops
5.	In packet switching network, which type of multiplexing techniques is used.
Option A:	OFDM
Option B:	FDM
Option C:	OTDM
Option D:	TDM
6.	A wavelength-routing network is example of _____ networks.
Option A:	First generation optical
Option B:	Second generation optical
Option C:	Packet switching
Option D:	Access
7.	Power penalty indicates_____ in signal to noise ratio due to the power loss taking place in across optical network.
Option A:	Reduction
Option B:	Increase
Option C:	Stabilization

Option D:	None of the above
8.	The routing and wavelength assignment problem addresses the core issue of _____
Option A:	Traffic patterns in a network
Option B:	Wavelength adjustment
Option C:	Wavelength continuity constraint
Option D:	Design problem
9.	Who had defined five OSI network management applications?
Option A:	ISO
Option B:	IEEE
Option C:	TMN
Option D:	ITU
10.	FCAPS is an acronym for…….
Option A:	Fault, Configuration, Accounting, Performance, Security
Option B:	Fault, Control, Accounting, Performance, Security
Option C:	Configuration
Option D:	Security
11.	Packet switching is also called as _____
Option A:	Frame switching
Option B:	Cell switching
Option C:	Trans-switching
Option D:	Buffer switching
12.	It is a passive device which allows the flow of optical signal power in only one direction and preventing reflections in the backward direction.
Option A:	Fiber slice
Option B:	Optical fiber connector
Option C:	Optical isolator
Option D:	Optical coupler
13.	Which feature of an optical isolator makes it attractive to use with optical amplifier?
Option A:	Low loss
Option B:	Wavelength blocking
Option C:	Low refractive index
Option D:	Attenuation
14.	SONET system can use _____.
Option A:	STS multiplexers
Option B:	Re generators
Option C:	add/drop multiplexers
Option D:	all of the above
15.	_____ is a standard developed by ANSI for fiber-optic networks.
Option A:	SONET
Option B:	SDH

Option C:	either (a) or (b)
Option D:	neither (a) nor (b)
16.	A strategy used for increasing the bitrate of digital optical fiber systems beyond the bandwidth capabilities of the drive electronics is known as _____
Option A:	Optical time division multiplexing
Option B:	Electrical time division multiplexing
Option C:	Frequency division multiplexing
Option D:	Code division multiplexing
17.	A regenerator is a _____ device.
Option A:	One layer
Option B:	Two layer
Option C:	Three layer
18.	An add/drop multiplexer is a _____ device.
Option A:	One layer
Option B:	Two layer
Option C:	Three layer
Option D:	Four layer
19.	Optical networking includes?
Option A:	LAN
Option B:	WAN
Option C:	MAN
Option D:	All of the above
20.	Which of the following is used to tie in other components, such as an OADM?
Option A:	Wave division multiplexer
Option B:	Optical amplifier
Option C:	Circulator
Option D:	Optical splitter

Option 1

Q2, Q3 and Q4. (20 Marks Each)	**Solve any Four out of Six** **5 marks each**
A	Compare Circulators and Isolators.
B	Explain the SONET architecture in detail
C	Write a short note on OTDM.
D	Explain in brief Optical layer.
E	Explain the concept of power penalty in optical networks.
F	Briefly explain the different network management functions.

Option 2

Q2, Q3 and Q4 (20 Marks Each)	**Solve any Two Questions out of Three** **10 marks each**
A	Explain the operating principle of WDM network and the architecture of WDM optical networks.

B	Write the necessity of wavelength converters in optical networks and explain its working.
C	What is Optical safety? Explain in brief optical safety in optical communication.
D	Explain in detail the generations of optical networks.
E	Explain in detail Packet interleaving techniques used in OTDM.
F	Explain virtual topology reconfiguration due to traffic change and fault restoration.
G	What is Four Wave Mixing?
H	Explain in brief WDM in optical communication
I	Explain in detail structure of SONET/SDH network
J	OTDM
K	Explain Optical Access Network
L	What is OTN (Optical Access Network)
M	Describe Passive optical Network
N	Explain Performance and fault management in optical network
O	Explain PON architecture in detail.

Note: This is the sample Question bank. The questions from question bank may or may not be included in final examination.

University of Mumbai
QUESTION BANK

Program: **Electronics and Telecommunication Engineering**

Examination: BE Semester: VIII

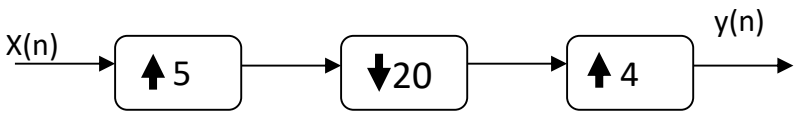
Course Code: ECCDLO 8042 and Course Name: Advanced Digital Signal Processing

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The cost function J depends upon_____ for optimization
Option A:	Correlation matrix
Option B:	input u(n)
Option C:	Filter weights
Option D:	desired input d(n)
2.	Weight update equation of _____ is W(n+1) = W(n) -½µg where g is the gradient vector of the cost function J(W) and µ is the step size
Option A:	Recursive Least square algorithm
Option B:	Levinson Durbin algorithm
Option C:	Least Mean square algorithm
Option D:	Steepest descent algorithm
3.	In Haar Wavelet, the Scaling function)(t) and the Wavelet function –(t)
Option A:	are Orthonormal functions
Option B:	are Orthogonal function
Option C:	are always out of phase
Option D:	are always inphase
4.	Full form of EEG is _____ and it represents electrical activity _____
Option A:	Electrocardiogram, Human Brain
Option B:	Electrocardiogram, Human heart
Option C:	Electroencephalogram, Human Brain
Option D:	Electroencephalogram, Human heart
5.	A baseband signal s(t) with 60 Hz bandwidth is sampled at a rate of Fs. The resultant signal is down sampled by a factor 3 to obtain the discrete samples s[n]. What is the largest lower bound on in Hz to reconstruct back the signal from the samples?
Option A:	360
Option B:	60
Option C:	180
Option D:	57
6.	Let the sampling frequency of a signal s(t) be 44.1 KHz. The sampling frequency of this signal needs to be up converted to 48KHZ. Find the interpolation (I) and decimation (D) factors.
Option A:	I=160, D=147
Option B:	I=147, D=160

Option C:	I=108, D=10
Option D:	I=48, D=44.1
7.	Anti-imaging filter with cut-off frequency ωc= π/ I is specifically used _____ upsampling process for the removal of unwanted images.
Option A:	Before
Option B:	At the time of
Option C:	After
Option D:	Instead of
8.	Synthesis filter banks are used for
Option A:	Separating a signal to several frequency bands
Option B:	combining the processed subband signals to one signal
Option C:	removing the noise in the signal
Option D:	removing the images frequencies
9.	Which of the following does not hold true for RLS algorithms?
Option A:	Complex
Option B:	Adaptive
Option C:	Slow Convergence Rate
Option D:	Powerful
10.	The value of forgetting factor (⌊) for the recursive least-square adaptive filter is
Option A:	$0 < ⌊ < 1$
Option B:	$-1 < ⌊ < 1$
Option C:	$1 < ⌊ < 2$
Option D:	$0 < ⌊ < 0.5$
11	Which of the following is the disadvantage of sampling rate conversion by converting the signal into analog signal?
Option A:	Signal distortion
Option B:	Quantization effects
Option C:	New sampling rate can be arbitrarily selected
Option D:	Signal distortion and quantization effects
12.	The non-parametric methods for power spectrum estimation suffer from
Option A:	phase distortion
Option B:	spectrum leakage effects
Option C:	amplitude distortion
Option D:	Aliasing errors
13.	In wiener filter it is assumed that noise and image are
Option A:	Different
Option B:	homogenous
Option C:	correlated
Option D:	uncorrelated
14.	What is the output of the single stage lattic
Option A:	x(n)+Kx(n+1)
Option B:	(n)+Kx(n-1)
Option C:	(n)+Kx(n-1)+Kx(n+1)

Option D:	Kx(n-1)
15.	Computational complexity is a measure of
Option A:	time
Option B:	Number of iterations
Option C:	Number of operations
Option D:	accuracy
16.	Which of the following is not an algorithm of equalizer
Option A:	Zero forcing algorithm
Option B:	Least mean square algorithm
Option C:	Recursive least square algorithm
Option D:	Mean square error algorithm
17.	K multiplication constants in digital filters are called
Option A:	Co-efficient
Option B:	multipliers
Option C:	sub tractors
Option D:	Filter coefficients
18.	The scaling function is
Option A:	Pentagonal
Option B:	square
Option C:	orthogonal
Option D:	oval
19.	Which of the following use quadrature mirror filters
Option A:	Sub band coding
Option B:	Trans-multiplexer
Option C:	Sub band coding and trans-multiplexer
Option D:	Trans-demultiplexer
20.	What is the width of main lobe of frequency response of rectangular window of length M-1
Option A:	Pi/M
Option B:	2pi/M
Option C:	4pi/M
Option D:	8pi/M

Q	
A	**Solve any Two** **5 marks each**
i.	Describe the Welch method for determination of power spectrum estimate power
ii.	Obtain the expression for y(n) in terms of x(n) for the multirate system shown below : 
iii.	Write any four characteristics of an adaptive system.
B	**Solve any One** **10 marks each**
i.	Determine the frequency resolution of Bartlett, Welch, and Blackman Tukey

	methods of power spectrum estimates for a quality factor Q=12. Assume that overlap in Welch method is 40 % and length of sample sequence is 1200.
ii.	A process x(n) is formed by passing white noise w(n) through a filter that has a system function : $$H(z) = \frac{1}{1 - 0.08z^{-1} - 0.9z^{-2}}$$ The variance of the white noise is $\sigma_w^2 = (0.19)(0.18)$. The LMS algorithm with two coefficients is used to estimate the d(n) from x(n). a. What is the maximum value of step size, μ, in order for the LMS algorithm to converge in mean? Hint: Find the autocorrelation sequence of x(n) b. What is the time constant for convergence?

Q	
A	**Solve any Two** **5 marks each**
i.	Compare LMS and RLS algorithm
ii.	Prove the Wiener Hopf Equation Derive the expression for MSE and Minimum value of MSE
iii.	What are the limitations of Fourier transform? Explain with two examples at least.
B	**Solve any One** **10 marks each**
i.	State and Prove the alias cancellation condition and Perfect reconstruction condition for the two band filter bank in the Haar MRA
ii.	Explain any one method of QRS complex detection in detail

Q	
A	**Solve any Two** **5 marks each**
i.	Derive the expression for mean square error E[e^2(k))] (MSE) for a linear combiner.
ii.	Explain the difference between STFT and Wavelet transform with the help of Time-Frequency tiling? And hence state the principle of Uncertainty
iii.	Write a short note on Adaptive Equalization
B	**Solve any One** **10 marks each**
i.	Explain Yule-Walker method for AR model parameters.
ii.	Explain how STFT is suitable for analysis of Speech signals.

Q **(20 Marks)**	**Solve any Four out of Six 5 marks each** ***Please delete the instruction shown in front of every sub question***
A	*Explain the frequency domain description of an Interpolator*
B	*Explain the procedure for realization of 2nd order lattice structure*
C	*Derive frequency domain transfer function of a decimator*
D	*Discuss the procedure for the design of IIR filters and what are the constraints in the design of IIR filters using analog structures.*
E	*What are the quantization errors in FFT algorithm? Explain them.*
F	*Explain the concept of spectral factorization theorem in detail*

Q	
A	Compare the Barlett method of signal modeling with Welch method in detail.
B	Derive Wiener-Hopf equation for FIR Wiener-filter and also obtain the expression for minimum mean square error.
C	Explain the Kalman filter estimation approach in detail. Derive the expression for Kalman gain that minimizes mean square error.

Q	
A	**5 marks each**
i.	Write the range of p in adaptive filtering and its role in filtering technique.
ii.	Give the impulse response of a Wiener filter.
iii.	Mention the advantage of exponentially weighted RLS
B	**10 marks each**
i.	Explain the periodogram method of spectrum estimation in detail and also obtain the variance of the periodogram
ii.	Derive the Yule-Walker equation for ARMA, AR and MA model in detail

Note: This is the sample Question bank. The questions from question bank may or may not be included in final examination.

University of Mumbai

Examinations Summer 2022

Sample Questions-Satellite Communication

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The period of Satellite around the earth can be computed using:
Option A:	Newton's law of gravitation
Option B:	Kepler's Second law
Option C:	Kepler's Third law
Option D:	Newton's third law
2.	A satellite antenna has a diameter of 3m and transmission frequency of 6 GHz . The 3-dB beam width is
Option A:	0.625 Degree
Option B:	1.25 Degree
Option C:	2.5 Degree
Option D:	5 Degree
3.	In a large earth station where beam width is small tracking is:
Option A:	Not necessary
Option B:	Necessary
Option C:	Not necessary for the GEO satellite
Option D:	Necessary for LEO satellite
4.	Path loss is :
Option A:	Same in uplink and downlink.
Option B:	Low in uplink and high in downlink.
Option C:	High in uplink and low in downlink.
Option D:	Low or high depends upon the propagation condition.
5.	In C band the normal uplink and downlink frequency is-------
Option A:	6GHz-4GHz
Option B:	14GHz-12GHz
Option C:	20GHz-16GHz
Option D:	32GHz-28GHz
6.	Which of the following terms is used to describe the microwave radiation which is present throughout the universe and appears to originate from matter in any form at a finite temperature?
Option A:	Noise factor
Option B:	Antenna loss
Option C:	Sky Noise
Option D:	Noise power spectral density
7.	Having a large Frame size in a TDMA system
Option A:	Increases the frame efficiency.
Option B:	Reduces the frame efficiency.
Option C:	Increases the channel capacity.
Option D:	Increases the buffer size at the earth station.

8.	Random access is suitable for
Option A:	Voice Transmission
Option B:	Data Transmission
Option C:	Video Transmission
Option D:	Transmitting all the above signals
9.	Most VSAT systems operate in the _____, although there are some C-band systems in existence
Option A:	Ka band
Option B:	Ku band
Option C:	L- band
Option D:	C band
10.	Iridium satellites are _____ satellites.
Option A:	GEO
Option B:	MEO
Option C:	LEO
Option D:	Geostationary
11.	In Satellite signals Horizontal polarization means?
Option A:	Electric field is parallel to earths Polar Axis
Option B:	Electric field is perpendicular to earths Polar Axis
Option C:	Electric field is parallel to earths Equatorial plane
Option D:	Electric field is In the boresight direction
12.	Which of the following transponders convert the uplink signal to downlink signal using two mixers
Option A:	Single conversion transponders
Option B:	Dual conversion transponders
Option C:	Regenerative transponders
Option D:	Dual mixer transponder
13.	Orbital position of satellite is governed by
Option A:	Ground station
Option B:	Transponder
Option C:	TT and C
Option D:	Power subsystem
14.	Terrestrial incoming base band signals at earth stations are converted in to-------
Option A:	Microwave carrier
Option B:	IF
Option C:	Base band
Option D:	RF formatted baseband
15.	The low-noise amplification must be provided at the cable input in order to
Option A:	Increase gain
Option B:	Reduce attenuation
Option C:	Maintain Signal to Noise ratio
Option D:	Minimize distortion
16.	The quality of space link is measured in terms of ----------ratio
Option A:	C/N

Option B:	S/N
Option C:	G/T
Option D:	EIRP
17.	Power flux density at a distance R meter is the power
Option A:	Transmitted per unit area
Option B:	Received at a distance R
Option C:	Received in unit area at a distance of r meters
Option D:	Received in unit area at a distance of 2R
18.	A receiver for frequency-hopping spread-spectrum would be:
Option A:	a narrowband receiver
Option B:	a wideband receiver
Option C:	a direct-conversion receiver
Option D:	CDMA receiver
19.	DAMA stands for
Option A:	Data accessibility master aerial
Option B:	Digital attenuators microwave antenna
Option C:	Dual accessibility mode antenna
Option D:	Demand assigned multiple access
20.	Most VSAT systems operate in the _____, although there are some C-band systems in existence
Option A:	Ka band
Option B:	Ku band
Option C:	L- band
Option D:	C band
21.	What is the frequency range of Ka-band?
Option A:	8 to 12GHz
Option B:	12 to 18GHz
Option C:	4 to 6GHz
Option D:	27 to 31GHz
22.	_____ is the path traced out on the earth's surface directly below the satellite.
Option A:	Station keeping
Option B:	Zenith
Option C:	Footprint
Option D:	Sub satellite path
23.	The period of Satellite around the earth can be computed using _____
Option A:	Newton's law of gravitation
Option B:	Kepler's Second law
Option C:	Kepler's Third law
Option D:	Newton's third law
24.	At the focus of parabolic reflector, which of the following antenna is used?
Option A:	Yagi Uda
Option B:	Dipole
Option C:	Horn
Option D:	Helical

25.	Which of the following is not applicable for earth station requirements?
Option A:	High gain in the direction of wanted signals
Option B:	Low effective noise temperature for the entire receiving system
Option C:	Maximum variation in performance due to local wind and weather
Option D:	High discrimination between orthogonally polarized signals
	Maximum variation in performance due to local wind and weather
26.	In satellite communication, the Intermediate Frequency (IF) can be chosen as ___ MHz by using a transponder having bandwidth of ____ MHz
Option A:	70, 36
Option B:	36, 70
Option C:	120, 60
Option D:	60, 120
27.	The point where the orbit crosses the equatorial plane going from north to south is called _____.
Option A:	Ascending node
Option B:	Descending node
Option C:	Line of nodes
Option D:	Line of apsides
28.	The inclination of a prograde orbit always lies between ___ and ___.
Option A:	0 degree & 90 degree
Option B:	90 degree & 180 degree
Option C:	180 degree & 270 degree
Option D:	270 degree & 360 degree
29.	Prime focus feed and Cassegrain feed system are examples of ____
Option A:	Balanced Configuration
Option B:	Asymmetric Configuration
Option C:	Axi-Symmetric Configuration
Option D:	Unbalanced Configuration
30.	Which of the following are the two important performance parameters of the Earth Stations?
Option A:	EIRP and G/T of receiver
Option B:	EIRP and modulator and Demodulator technique
Option C:	Frequency band and size of antenna
Option D:	Multiple access technique and size of earth station
31.	In satellite communication, IF can also be chosen as ____ MHz by using a transponder having bandwidth of either ___ MHz or ____ MHz
Option A:	140MHz, 54MHz, 72MHZ
Option B:	240MHz, 45MHz, 90MHz
Option C:	170MHz, 55MHz, 85MHz
Option D:	150MHz, 65MHz, 95MHz
32.	Determine apogee and perigee distances. If the difference between apogee and perigee distances in case of an elliptical orbit is 34000km and the major axis of the elliptical orbit is 50000km,
Option A:	50000km, 42000km
Option B:	42000km, 8000km

Option C:	42500km, 8500km
Option D:	50000km, 8500km
33.	A major difference between DBS TV and conventional TV is that in DBS _____ is used, whereas with conventional TV _____in the form of vestigial single side-band (VSSB) is used.
Option A:	Frequency modulation, amplitude modulation
Option B:	Frequency modulation, digital modulation
Option C:	Phase modulation, amplitude modulation
Option D:	Frequency modulation, phase modulation
34.	Which of the following is not true about LNA?
Option A:	It amplifies a very low-power signal without significantly degrading its signal-to-noise ratio.
Option B:	It is placed near the transmitting antenna.
Option C:	LNA has a low noise figure and a very high gain.
Option D:	Noise figure, Gain and Linearity are important parameters for LNA
35.	The equatorial ellipticity of the earth causes geostationary satellite to drift to one of the two stable points, at
Option A:	45° E & 165 ° W
Option B:	55° E & 125 ° W
Option C:	75° E & 105 ° W
Option D:	85° E & 115 ° W

Option 1

Q2, Q3 and Q4 (20 Marks Each)	**Solve any Four out of Six** **5 marks each**
A	Explain transponder sub-system.
B	What are the limits of Visibility of satellites? How is it calculated?
C	Discuss in brief general configuration of an earth station.
D	Explain the following: a. EIRP and G/T b. Combined Uplink and Downlink C/N ratio
E	Compare centralized and distributed control of demand assignment.
F	Explain GPS in detail.
G	Write the advantages and disadvantages of Satellite Communication
H	Define different orbital Parameters.
I	What are Look angles? Explain in brief
J	What do you understand by Station Keeping? What are the methods used for that?
K	Why is Uplink frequency greater than the downlink frequency? Explain.
L	What are the types of Launch Vehicles used for Satellite Launching?
M	What are the requirements of an Earth Station antenna?
N	Write brief notes on the advantages and disadvantages of using satellites in LEOs, MEOs and GEOs for satellite communications.
O	What are the functions carried out in Telemetry, Tracking & Command (TT&C) Subsystem?
P	Calculate the gain of a 3m parabolidal antenna operating at a frequency of 12GHZ.Assume an aperture efficiency of 0.5.
Q	Derive and express the link equation for received power at the earth station.

R	Explain the EIRP& Transmission losses.
S	Explain the carrier to noise ratio of uplink & downlink frequency.
T	Write notes on atmospheric absorption and scintillation at troposphere and ionosphere.
U	Derive the expression for C/N for uplink.

Option 2

Q2, Q3 and Q4 (20 Marks Each)	**Solve any Two Questions out of Three 10 marks each**
A	State and explain Kepler's law of planetary motion with a diagram.
B	Define the following with respect to TWT amplifier a. 1 dB compression point b. Input and Output back-off c. 3rd order Intermodulation Noise d. Am/PM conversion coefficient
C	With the help of a block diagram, describe working of transmit receive earth station used for telephone traffic.
D	Explain the principle behind spreading and despreading and how it is used to minimize interference in a CDMA system.
E	What are the different types of lasers used for satellite communication? Explain acquisition link model for optical communication.
F	Explain TT & C subsystem. Explain the role of multi tone frequency in tracking.
G	Discuss the mechanics of launching a satellite
H	What is the earth eclipse of a satellite? Are there any ways of avoiding an eclipse during the lifetime of a satellite.
I	Write short note on tracking techniques in geostationary satellites.
J	Explain different types of antennas used in satellite communication system with its purpose.
K	Determine how many carriers can access an 80 MHz transponder in the FDMA mode given that each carrier required bandwidth of 6MHz, allowing for 6.5 dB o/p back off. Compare this number with the number of carriers possible without back off.
L	An LNA is connected to a receiver which has a noise figure of 12 dB. The gain of LNA is 40 dB and its noise temperature is 120K. Calculate the overall noise temperature referred to LNA input.
M	Explain in detail the operation of the Spade system of demand assignment. Explain what is meant by thin route service? Suggest the type of satellite access is most suitable for this service.
N	Explain bandwidth limited and power limited FDMA in detail.
O	What are the different types of lasers used for satellite communication? Explain photo detector noise model.
P	Derive the expression for antenna look angles.
Q	What are different orbital elements?
R	What are the methods used for attitude control? Explain them.
S	Derive the expression for combined uplink/downlink C/N ratio.

Option 3

Q2, Q3 and Q4. (20 Marks Each)	
A	**Solve any Two 5 marks each**

i.	Explain spacecraft power subsystem.
ii.	List out different phenomena which lead to signal loss on transmission through the earth's atmosphere
iii.	Explain the Satellite switched TDMA.
B	**Solve any One** **10 marks each**
i.	Describe the operation of typical VSAT system. State briefly where VSAT systems find widest applications.
ii.	Describe and compare the MATV and CATV systems.
iii	Explain different types of antennas used in satellite communication.
iv	Explain SPADE system.
v	Compare TDMA, FDMA & CDMA multiple access techniques in satellite communication.
vi	Explain LASER satellite communication.
vii	Write short note on reliability and quality assurance.
viii	What are design considerations of earth station?
ix	Explain pre assigned/demand assigned TDMA.

Note: This is the sample Question bank. The questions from question bank may or may not be included in final examination.

University of Mumbai
QUTION BANK

Program: **Electronics and Telecommunication Engineering**
Examination: BE Semester: VIII
Course Code: **ECCDLO8044**
Course Name: **Network Management in Telecommunication**

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	An ATM interface management entity (IME) module has three versions namely _____.
Option A:	user, network, and system
Option B:	network element, network, and system
Option C:	link, network, and system
Option D:	switch, network, and system
2.	At the highest level of integrated architecture of TMN are the functions associated with _____.
Option A:	Network management
Option B:	Service Management
Option C:	Business Management
Option D:	System Management
3.	What Kind of messages are sent by SNMP agents?
Option A:	GetRequest
Option B:	SetRequest
Option C:	Trap
Option D:	Set-Reset
4.	Which one of the following is not the challenge for IT managers?
Option A:	Managing complex network systems
Option B:	Managing converged networks
Option C:	Management of information
Option D:	Management of single and simple network system
5.	In TMN terminology, the switching systems, circuits, terminals, etc.,which comprise a telecommunications network, are known as
Option A:	Operations Support Systems (OSS)
Option B:	Network Elements (NEs)
Option C:	Mediation Devices (MDs)
Option D:	Q Adapter (QA)
6.	What are the goals of performance management in FCAPS?
Option A:	System turn-up, network provisioning, auto discovery, backup and restore, database handling
Option B:	Trend Analysis and Capacity Planning, Billing, Auditing, Cost Allocation
Option C:	Collect data, analyze data, set thresholds, make changes, test changes
Option D:	Identify, isolate, correct, test and record

7.	In the Telecommunication management Network (TMN) system, the role of the manager is to issue commands and requests to the agent. These commands and requests are known as
Option A:	Notifications
Option B:	Feedbacks
Option C:	Operations
Option D:	Acknowledgements
8.	For SNMP, ___ defines the general rules for naming objects, defining object types, and showing how to encode objects and values.
Option A:	SMI
Option B:	MIB
Option C:	BER
Option D:	IB
9.	Two types of ATM switches are
Option A:	VPI and VCI
Option B:	VP and VPC
Option C:	PVC and SVC
Option D:	PVC and SUV
10.	Based on predefined policy of network management, controlling access to the network is the task of
Option A:	Fault management
Option B:	Performance management
Option C:	Active management
Option D:	Security management
11.	Main Challenges of IT Managers
Option A:	Reliability & Rapid technological advance
Option B:	Searching for clients
Option C:	To follow the IT Rules
Option D:	To Convince Customer
12.	The application-level protocol in which a few manager stations control a set of agents is called _____
Option A:	SNMP client program
Option B:	SNMP client post
Option C:	SNMP client path
Option D:	SNMP client protocol
13.	How many functional blocks used in TMN
Option A:	Seven
Option B:	Four
Option C:	Five
Option D:	Six
14.	In the pure ATM LANs, stations can exchange data at one of two standard rates of ATM technology i.e. 155 and
Option A:	750 Mbps
Option B:	850 Mbps

Option C:	900 Mbps
Option D:	652 Mbps
15.	Agent Gathers information from objects
Option A:	To generates alarms and sends them to NMS.
Option B:	To generates alarms and sends them to mangers.
Option C:	To check Objects running Configuration.
Option D:	To keep object information in MDB
16.	To creates a collection of named objects, their types and their relationships to each other in an entity to be managed, we use
Option A:	SMI
Option B:	SNMP
Option C:	SMTP
Option D:	MIB
17.	Which network management function is used for Usage measurement, Tariffing and pricing, Collections and finance and Enterprise control?
Option A:	Configuration
Option B:	Fault
Option C:	Accounting
Option D:	Security
18.	Service level management helps to_____
Option A:	Satisfy customer needs the commitments of the service provider.
Option B:	Performance statistics in network management.
Option C:	Understand the importance of policies and procedures.
Option D:	Locate the fault, detection and fault isolation.
19.	An ATM cell has the payload field of
Option A:	32 bytes
Option B:	48 bytes
Option C:	64 bytes
Option D:	128 bytes
20.	RMON 1 provides network visibility into the_____
Option A:	application layer
Option B:	data link and application layer
Option C:	physical and application
Option D:	data link and physical layer

Q	
A	**5 marks each**
i.	List and describe emerging network management standards.
ii.	What are the functional requirements of NMS design?
iii.	What is Management Information Tree
B	**10 marks each**

i.	Describe Network Management Communication and Function Model.
ii.	With respect to OSI Network Management describe terms as ACSE, ROSE, Scoping and Filtering Linked Replies, CMIS/ CMIP, GDMO
Q	**5 marks each**
i.	What is CMIP?
ii.	Draw and describe with a neat diagram SNMP v1 PDU format.
iii.	Describe reasons for RMON
iv	Differentiate RMON and SNMP
v	Explain TNM conceptual model.
vi	Explain ATM remote monitoring
Q	**10 marks each**
i.	List and describe emerging web-based enterprise management standards?
ii.	Describe Broadband Network Management?
iii	Explain various M-interfaces used between an ATM end user or device and an ATM network.

Q	**5 marks each**
A	What is OMAP in network management?
B	Describe reasons for RMON development?
C	Explain TMN Conceptual Model.
D	What is role of event correlation technique for root cause analysis?
E	What is the role of ILMI and SNMP in ATM Management?
F	What is encoding mechanisms are used for ASN.1?

Q	**10 marks each**
A	Define network management. List and describe network management architectures?
B	What is fault management? Describe five steps process in fault management.
C	Describe two-tier and three-tire network management organization model.

Q4	
A	**Solve any Two** **5 marks each**
i.	Compare between CMIS/CMIP and SNMP
ii.	What are the challenges faced by the network managers while managing the network?
iii.	Explain M1 and M2 interface in details.
B	**Solve any One** **10 marks each**
i.	What is an SNMP Proxy Server? Explain in detail.
ii.	You are administering the 24000 workstations in an organization. You are pinging each station periodically. The message size in both directions is 128 bytes long. The NMS you are using is on a 10Mbps LAN, which functions with 30% efficiency. What would be the frequency of your ping were if you were not to exceed 5% overhead?

Note: This is the sample Question bank. The questions from question bank may or may not be included in final examination.