University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: BE Electronics and Telecommunication Engineering

Curriculum Scheme: R2012

Examination: BE Semester VII

Course Code: ETC702 and Course Name: Mobile Communication

Time: 2 hour Max. Marks: 80

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Note to the students: - All the Questions are compulsory and carry equal marks.

Q1.	Choose the correct option for following questions.
1.	__ occurs when the radio path between a TX and RX is obstructed by a surface with sharp irregular edges
Option A:	diffraction
Option B:	scattering
Option C:	Refraction
Option D:	diversity
2.	Walsh codes are used as channelization codes in ____ .
Option A:	AMPS
Option B:	GSM
Option C:	WCDMA
Option D:	cdma2000
3.	GPRS is an overlay on the top of the --- physical layer and network entities
Option A:	IS 95
Option B:	GSM
Option C:	AMPS
Option D:	ETACS
4.	What is the minimum amount of RF spectrum needed for an FDD LTE radio channel?
Option A:	2.8 MHz
Option B:	1.4 MHz
Option C:	3 MHz
Option D:	2 MHz
5.	Downlink modulation used in WCDMA is
Option A:	QPSK
Option B:	BPSK
Option C:	8FSK
Option D:	QAM
6.	GSM has RF channel bandwidth of
Option A:	250 KHz
Option B:	200 KHz
Option C:	100 KHz
Option D:	1.25 MHz

7.	__ antenna has the property of radiating waves more effectively in some direction than others.
Option A:	omnidirectional
Option B:	directional
Option C:	Smart
Option D:	Sectored
8.	If the cell size antenna height is doubled there will be
Option A:	increase in propagation path loss by 6 dB
Option B:	reduction in path loss by 6 dB
Option C:	reduction in path loss by 12 dB
Option D:	no change in path loss
9.	The range of frequencies over which channel can be considered flat
Option A:	coherence bandwidth
Option B:	bandwidth
Option C:	spectrum
Option D:	guard band
10.	Cells which use same set of frequencies or channels are called
Option A:	adjacent cells
Option B:	cluster cells
Option C:	co channel cells
Option D:	Intercells
11.	Minimum frequency band required for 3X cdma technology is
Option A:	1.25 MHz
Option B:	7.5 MHz
Option C:	5 MHz
Option D:	10 MHZ
12.	Time slot period in GSM is
Option A:	570 ms
Option B:	577 microseconds
Option C:	577 ms
Option D:	570 seconds
13.	IMSI number used as GSM identifier is of __ digits
Option A:	9
Option B:	15
Option C:	12
Option D:	10
14.	The early FM push-to-talk telephone systems were used in
Option A:	half duplex
Option B:	simplex
Option C:	full duplex
Option D:	modulation

15.	The access point in LTE is called as
Option A:	MS
Option B:	BTS
Option C:	eNodeB
Option D:	GPRS
16.	A cellular communication area is covered with 12 clusters having 7 cells in each cluster and 16 channels assigned in each cell. How many number of channels will be available per cluster
Option A:	212
Option B:	112
Option C:	100
Option D:	23
17.	X2 Interface is used for
Option A:	eNB and MME
Option B:	eNB and servicing
Option C:	Inter eNB
Option D:	EUTRAN
18.	Multiple modulation and coding schemes are observed in
Option A:	EDGE
Option B:	GSM
Option C:	GPRS
Option D:	HSCSD
19.	Cdma2000-1xRTT system supports a typical throughput of
Option A:	154kbps
Option B:	144kbps
Option C:	200kbps
Option D:	200mbps
20.	Network planning in CDMA systems involves
Option A:	frequency planning
Option B:	PN code planning
Option C:	power planning
Option D:	bandwidth planning

Q2	**Solve any Four out of Six.** **5 marks each**
A	Explain the microcell zone concept.
B	Explain Space Division Multiple Access.
C	List IS 95 air interface specifications.
D	Compare WCDMA and cdma2000.
E	What are the key features of EDGE?
F	Write a short note on types of large scale fading.

Q3	**Solve any Two Questions out of Three** **10 marks each**
A	Explain GSM architecture with a suitable diagram in detail.
B	Explain adaptive multi antenna techniques for 4G systems.
C	Explain methods to improve capacity of a cellular system in detail.

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Examination: BE Semester VII

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Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	D
Q3.	B
Q4	A
Q5	A
Q6	B
Q7	B
Q8.	B
Q9.	A
Q10.	C
Q11.	B
Q12.	B
Q13.	B
Q14.	A
Q15.	C
Q16.	B
Q17.	C
Q18.	A
Q19.	B
Q20.	B

University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: ETE 703 and Course Name: NEURAL NETWORK AND FUZZY LOGIC

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which is the fundamental unit of artificial neural networks?
Option A:	brain
Option B:	nucleus
Option C:	Neuron
Option D:	Axon
2.	What type of shape does dendrites have?
Option A:	Oval
Option B:	Round
Option C:	Tree
Option D:	Rectangular
3.	_____ in artificial neurons are inspired by Synapse in Biological neurons.
Option A:	Weights
Option B:	Threshold
Option C:	Activation function
Option D:	Input
4.	Feature of ANN in which ANN creates its own organization or representation of information it receives during learning time is_____.
Option A:	Adaptive Learning
Option B:	What-If Analysis
Option C:	Self-Organization
Option D:	Supervised Learning
5.	Given that a 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The corresponding inputs are 4, 10, 5 and 20 respectively. Calculate the output. Consider Bias value zero.
Option A:	238
Option B:	76
Option C:	119
Option D:	123
6.	Which of the following statements is correct for back propagation neural networks?
Option A:	It is another name given to the curvy function in the perceptron
Option B:	It is the transmission of error back through the network to adjust the inputs

Option C:	It is the transmission of error back through the network to allow weights to be adjusted so that the network can learn.
Option D:	It is the transmission of error in forward direction in the network
7.	Which is the correct option for an auto-associative network?
Option A:	a neural network that contains no loops
Option B:	a neural network that contains feedback
Option C:	a neural network that has only one loop
Option D:	a single layer feed-forward neural network with pre-processing
8.	What is a perceptron?
Option A:	Feed-forward neural network
Option B:	Back-propagation algorithm
Option C:	Back-tracking algorithm
Option D:	Feed Forward-backward algorithm
9.	Which of the following options is correct for gradient descent?
Option A:	method to find the absolute maximum of a function
Option B:	maximum or minimum, depends on the situation
Option C:	method to find the absolute minimum of a function
Option D:	Method to find mean value of the function.
10.	How many basic fundamental types of learning are there in neural networks?
Option A:	1
Option B:	2
Option C:	3
Option D:	4
11.	Why is the XOR problem exceptionally interesting to neural network researchers?
Option A:	Because it can be expressed in a way that allows you to use a neural network
Option B:	Because it is complex binary operation that cannot be solved using neural networks
Option C:	Because it can be solved by a single layer perceptron
Option D:	Because it is the simplest linearly inseparable problem that exists.
12.	Delta learning and LMS learning methods falls under which of the following types?
Option A:	Error correction learning in supervised form
Option B:	Reinforcement learning- learning with a critic
Option C:	Hebbian learning
Option D:	Competitive learning in unsupervised form
13.	Which of the following relates to exploratory learning?
Option A:	Supervised learning
Option B:	Active learning
Option C:	Unsupervised learning
Option D:	Reinforcement learning
14.	Which type of artificial neural network can be used to control an autonomous land vehicle?
Option A:	Linear feed-forward network.
Option B:	Multi-layer feed-forward network.

Option C:	McCulloch Pitts model.
Option D:	Single linear perceptron
15.	Which is the simplest pattern recognition task in a feedback network?
Option A:	hetero-association
Option B:	auto-association
Option C:	can be hetero or auto-association, depends on situation
Option D:	Clustering
16.	Which of the following provides a framework for studying object recognition?
Option A:	Learning
Option B:	Unsupervised learning
Option C:	Supervised learning
Option D:	Validation
17.	Which of the following approaches is used in Fuzzy Logic?
Option A:	IF and THEN Approach
Option B:	FOR Approach
Option C:	WHILE Approach
Option D:	DO Approach
18.	A fuzzy set wherein no membership function has its value equal to 1 is called as___.
Option A:	Normal fuzzy set
Option B:	Subnormal fuzzy set
Option C:	Convex fuzzy set
Option D:	Concave fuzzy set
19.	What is the purpose of the aggregation in fuzzy logic?
Option A:	To gather all the different fuzzy set outputs and combine them into a single fuzzy set output.
Option B:	To gather all the possible inputs and use the average to gain an output
Option C:	To gather all the different fuzzy set outputs and average them out to get a single value
Option D:	To subtract all the output fuzzy set values from the input values.
20.	Fuzzy logic is a form of which of the following logic?
Option A:	Two-valued logic
Option B:	Crisp set logic
Option C:	Many-valued logic
Option D:	Binary set logic

Q2	**Solve any Two Questions out of Three** **10 marks each**
A	Describe a data learning rule with flowchart.
B	Draw Hopfield neural network with four output nodes. Also explain the training and testing algorithm of Hopfield neural network.
C	Explain any four methods for defuzzification.

Q3	**Solve any Two Questions out of Three** **10 marks each**
A	Describe the application of neural networks for face recognition.
B	Explain how fuzzy logic can be used in image smoothing.
C	What are the performance measures to see whether training of neural networks is successful? Explain.

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Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: ETE 703and Course Name: NEURAL NETWORK AND FUZZY LOGIC

Time: 2 hour Max. Marks: 80

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Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	C
Q2.	C
Q3.	A
Q4	C
Q5	A
Q6	C
Q7	B
Q8.	A
Q9.	C
Q10.	C
Q11.	D
Q12.	A
Q13.	C
Q14.	B
Q15.	B
Q16.	C
Q17.	A
Q18.	B
Q19.	A
Q20.	C

University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Electronics & Telecommunication

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: ETC 703 and Course Name: Optical Communication and Networks

Time: 2 Hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The maximum angle at which external light rays may strike the air/glass interface and still propagate down the fiber.
Option A:	Acceptance cone half-angle
Option B:	Acceptance cone
Option C:	Critical angle
Option D:	Angle of incidence
2.	It is a graphical representation of the magnitude of the refractive index across the fiber.
Option A:	Mode
Option B:	index profile
Option C:	numerical aperture
Option D:	refractive index
3.	Single-mode step-index cable has a core diameter in the range of.
Option A:	100 to 1000 micrometer
Option B:	50 to 100 micrometers
Option C:	5 to 15 micrometers
Option D:	8 to 10 micrometers
4.	Attenuation in fiber in general
Option A:	Decreases with increase in length of fiber
Option B:	Increases with increase in length of fiber
Option C:	Increases with decrease in length of fiber
Option D:	Doesn't change with length of fiber
5.	When the mean optical power launched into an 8 km length of fiber is 120 μW, the mean optical power at the fiber output is 3 μW. The overall signal attenuation is=
Option A:	20 dB
Option B:	10 dB
Option C:	1.6 dB
Option D:	16 dB
6.	Mie Scattering occurs when the size of the scattering center becomes:
Option A:	Very Smaller than wavelengths at which Rayleigh Scattering occurs
Option B:	Larger than wavelengths at which Rayleigh Scattering occurs
Option C:	Equal to wavelengths at which Rayleigh Scattering occurs

Option D:	Doesn't depend on wavelength
7.	Population inversion is obtained at a p-n junction by _____
Option A:	Heavy doping of p-type material
Option B:	Heavy doping of n-type material
Option C:	Light doping of p-type material
Option D:	Heavy doping of both p-type and n-type material
8.	The absence of_---------- in LEDs limits the internal quantum efficiency.
Option A:	Proper semiconductor
Option B:	Adequate power supply
Option C:	Optical amplification through stimulated emission
Option D:	Optical amplification through spontaneous emission
9.	The fraction of incident photons generated by photodiode of electrons generated collected at detector is known as _____?
Option A:	Quantum efficiency
Option B:	Absorption coefficient
Option C:	Responsivity
Option D:	Angel recombination
10.	Which are the two main sources of noise in photodiodes without internal gain?
Option A:	Gaussian noise and dark current noise
Option B:	Internal noise and external noise
Option C:	Dark current noise & Quantum noise
Option D:	Gaussian noise and Quantum noise
11.	Choose the correct statement
Option A:	Rise time of LED is smaller than rise time of LASER
Option B:	Rise time of LED is equal to rise time of LASER
Option C:	Rise time of LED is 2 time smaller than rise time of LASER
Option D:	Rise time of LED is greater than rise time of LASER
12.	In the _____ topology, the data generally circulates bi-directionally.
Option A:	Mesh
Option B:	Bus
Option C:	Star
Option D:	Ring
13.	A linear SONET network can be _____
Option A:	point-to-point
Option B:	multi-point
Option C:	both point-to-point and multi-point
Option D:	single point
14.	Basically, solitons are pulses which propagates through the fiber without showing any variation in _____
Option A:	Amplitude
Option B:	Frequency
Option C:	Shape

Option D:	Amplitude, Velocity and Shape
15.	SONET stands for _____
Option A:	synchronous optical network
Option B:	synchronous operational network
Option C:	stream optical network
Option D:	shell operational network
16.	In OTDM method, optical signals representing data streams from multiple sources are _____in time to produce a single data stream
Option A:	Interleaved
Option B:	Multiplexed
Option C:	Added
Option D:	Demultiplexed
17.	The _____ Topology forms a central hub to the network which may be either active or passive.
Option A:	Ring
Option B:	Star
Option C:	Mesh
Option D:	Bus
18.	In OTDR test echo occurs when there are:
Option A:	Unwanted multiple reflections
Option B:	No reflections
Option C:	Multiple refractions
Option D:	No refractions
19.	For measuring the shape of input pulse in time-domain intermodal dispersion method, the test fiber is replaced by another fiber whose length is less than ---- of the test fiber.
Option A:	1%
Option B:	5%
Option C:	10%
Option D:	2 %
20.	Scattering losses in optical fiber arise from:
Option A:	Variation of length of fiber
Option B:	Impurities in material
Option C:	Microscopic variations in the material density
Option D:	Variation in dimensions of cladding

Subjective/Descriptive Questions

Q2	**Solve any Two Questions out of Three 10 marks each**
A	What are the desirable requirements of a good connector? What are the lensing schemes for coupling improvements?
B	List different types of fiber fabrication techniques and explain any one of them.
C	Explain OTDR working principle in detail. Mention its limitations.

Q3.	
A	**Solve any Two** **5 marks each**
i.	Define Spontaneous Emission, Stimulated Emission and Quantum Efficiency.
ii.	Compare Isolators and Circulator.
iii.	Explain Macro-bending loss.
B	**Solve any One** **10 mark each**
i.	Sketch the Refractive Index Profile of SIF and GIF. Derive an expression for Numerical Aperture and Number of Modes in SIF.
ii.	Derive an expression for Responsivity of PIN photodiode. Differentiate PIN and RAPD photodiodes.

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Program: **Electronics & Telecommunication**

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: ETC 703 and Course Name: Optical Communication and Networks

Time: 2 Hour Max. Marks: 80

==========

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	B
Q3.	D
Q4	B
Q5	D
Q6	B
Q7	D
Q8.	C
Q9.	A
Q10.	C
Q11.	D
Q12.	B
Q13.	C
Q14.	D
Q15.	A
Q16.	A
Q17.	B
Q18.	A
Q19.	A
Q20.	C

University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **EXTC**

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: ETE702 and Course Name: Statistical Signal Processing

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Consider the variable X depending on time t and an event u of the sample space S. If t is a constant, then X is known as
Option A:	Random variable
Option B:	Stochastic process
Option C:	Constant
Option D:	Undetermined
2.	Stochastic processes are
Option A:	Strict sense stationary process
Option B:	Wide sense stationary process
Option C:	Always non-stationary
Option D:	Constants
3.	A statement made about a population for testing purpose is called
Option A:	Statistic
Option B:	Hypothesis
Option C:	Level of significance
Option D:	Test-statistic
4.	A quiz consists of 9 True/False questions. Assume that the questions are independent. Also, assume that (T) and (F) are equally likely outcomes when guessing on any one of the questions. What is the probability of guessing on each of the 9 quiz questions and getting more than one of the True/False questions wrong?
Option A:	0.998
Option B:	0.018
Option C:	0.020
Option D:	0.980
5.	A point estimator is defined as
Option A:	the average of the sample values
Option B:	the average of the population values
Option C:	a single value that is the best estimate of an unknown population parameter
Option D:	a single value that is the best estimate of an unknown sample statistic
6.	If the null hypothesis is false then which of the following is accepted
Option A:	Null Hypothesis

Option B:	Positive Hypothesis
Option C:	Negative Hypothesis
Option D:	Alternative Hypothesis
7.	Suppose we conducted a study that found that pedestrians were more likely to give money to a street beggar if the beggar had a cute and hungry-looking dog with them, and this effect was identical for both male and female pedestrians. If we calculated the difference between men and women in the no dog condition and plotted this value against the difference between men and women in the dog condition, which of the following values is most likely to represent the gradient of our graph?
Option A:	22.7
Option B:	33.8
Option C:	1
Option D:	0
8.	Which one of the following statements is correct?
Option A:	If the sample size n increases, the confidence interval becomes wider
Option B:	A 90% confidence interval for the population mean is narrower than a 95% confidence interval for the population mean
Option C:	As the population standard deviation increases, the confidence interval becomes narrower
Option D:	If alpha = 0.01, it implies that we are 1% confident that the population mean will lie between the confidence limits
9.	Why is spread spectrum technique inefficient for a single user?
Option A:	Large transmission bandwidth
Option B:	Small transmission bandwidth
Option C:	Fixed transmission bandwidth
Option D:	Fixed null bandwidth
10.	How many dependent variables does a two-way ANOVA have?
Option A:	1
Option B:	2
Option C:	3
Option D:	4
11.	Suppose that a random sample of 50 bottles of a particular brand of cough medicine is selected and the alcohol content of each bottle is measured. The sample mean alcohol content is 8.6 ml with the population standard deviation of 2.54 ml. Calculate the 95% confidence interval for the true mean alcohol content for the population of all bottles of the brand under study.
Option A:	(7.55, 9.65)
Option B:	(8.15, 10.25)
Option C:	(7.49, 9.71)
Option D:	(7.68, 9.52)
12.	The radar in which both transmission and reception is done using the same antenna are called
Option A:	Monostatic radar
Option B:	Bistatic radar

Option C:	Monopole radar
Option D:	Dipole radar
13.	Which of the following exam scores is better relative to other students enrolled in the course? i) A chemistry exam grade of 85, the mean grade for the chemistry exam is 92 with a standard deviation of 3.5; ii) A physics exam grade of 67, the mean grade for the physics exam is 79 with a standard deviation of 8; iii) A biology exam grade of 62, the mean grade for the biology exam is 62 with a standard deviation of 5
Option A:	The chemistry exam score is relatively better
Option B:	The physics exam score is relatively better
Option C:	The biology exam score is relatively better
Option D:	All of the exam scores are relatively equivalent
14.	Assume the observation model Y(n) = X(n) + V(n) where V(n) is a zero-mean white noise with variance 1 and X(n) has the auto-correlation function R(m) = 0.5^(|m|), where m is any real number. If h(0) and h(1) are the optimal 2-length FIR Wiener filter coefficients to estimate X(n), then
Option A:	h(0) = 0.451 and h(1) = 0.165
Option B:	h(0) = 0.472 and h(1) = 0.166
Option C:	h(0) = 0.467 and h(1) = 0.133
Option D:	h(0) = 0.491 and h(1) = 0.114
15.	Consider a hypothesis H0 where phi0 = 5 against H1 where phi1 > 5. The test is?
Option A:	Right tailed
Option B:	Left tailed
Option C:	Center tailed
Option D:	Cross tailed
16.	A Kalman filter is
Option A:	an FIR filter of fixed length implemented recursively
Option B:	an IIR filter
Option C:	an order non-recursive filter
Option D:	signal-model based linear filter
17.	Suppose X1, X2 and X3 are three correlated random variables. Let X' = h1 X1 + h2 X2 is a linear minimum mean square estimator of X3 based on X1 and X2. Then,
Option A:	X3' = E(X3)/(X1X2)
Option B:	h1 = E(X1X3)/E(X1X1)
Option C:	h2 = E(X2X3)/E(X2X2)
Option D:	E[X3 - h1 X1 + h2 X2]X1 = 0
18.	A causal IIR Wiener filter to estimate X(n) from the noisy observations Y(n) is a cascade of two filters: the whitening filter H1(Z) with Y(n) as the input and the causal IIR Wiener filter H2(Z) with the innovation as the input. If Y(n) has the power spectral density S(w) = 1.36 - 1.2 cos(w), then H1(Z) is equal to
Option A:	1 / (1 - 1/(3Z))
Option B:	1 - 1/(3Z)
Option C:	1 - Z/3
Option D:	1 / (1 - Z/3)

19.	In the ANOVA procedure, the 'factor' refers to
Option A:	the dependent variable
Option B:	the independent variable
Option C:	different levels of a treatment
Option D:	the critical value of F
20.	In estimation theory, the term 1 - alpha refers to
Option A:	probability that the confidence interval does not contain the population parameter
Option B:	the level of confidence minus one
Option C:	the level of confidence
Option D:	the level of confidence plus one

Q2. **(20 Marks)**	**Solve any Four out of Six** **5 marks each**
A	Consider the stochastic process X(n) = A cos (wn + phi) where w is a constant, A ~ Bi(1, 0.5) and phi ~ U(0, 2 pi) are two independent random variables. Determine whether X(n) is a wide sense stationary process.
B	Define (i) Bias of an estimator, (ii) MVU estimator, with examples.
C	Let X(t) and Y(t) be independent WSS random processes and Z(t) = X(t)Y(t). Determine the PSD of Z.
D	In a class, 60% of the students know the answer to a particular multiple-choice question. IF a student knows the answer to a question, he has a 10% probability of making a mistake due to an oversight. On the other hand, if he does not know the answer, he chooses one out of the 4 options with equal probability. Given that the student has answered the questions correctly, what is the probability that he does not know the answer?
E	A WSS process X(n) is given by X(n) = V(n) - 0.5 V(n-1), where V(n) is a zero-mean unit variance white noise. Determine the mean and auto-correlation of X(n).
F	Suppose X1, X2, X3, ..., XN are IID random samples with the joint PDF f(X, t) = 1/(5-t) for t < x < 5. Determine the MLE estimate of t.

Q3. **(20 Marks)**	**Solve any Four out of Six** **5 marks each**
A	Consider a AR(1) signal X(n) = a X(n-1) + W(n) and the noisy observation given by Y(n) = X(n) + V(n), where W(n) and V(n) are white noises and V(n) is independent of X(n) and W(n). Determine the Kalman innovation signal Y(n).
B	What are stationary and ergodic stochastic processes? Give suitable examples.
C	Suppose X = AT + e where A is a full-rank matrix with independent columns and e is a zero-mean uncorrelated vector with variance s^2. Determine the least square estimator of T.
D	Suppose X1, X2, X3, ..., XN are IID Gaussian random variables with an unknown mean mu and unknown variance s^2. Determine the corresponding Fisher information matrix.
E	The output of a discrete time linear system is described by Y(n) = 0.8 Y(n-1) + X(n). If X(n) is a WSS process with the PSD S(w), then determine the PSD of Y(n).

F	A WSS process X(n) is given by X(n) = 0.5 X(n-1) + V(n) - 0.6 V(n-1) + 0.1 V(n-2), where V(n) is a zero-mean unit variance white noise. Determine the auto-correlation function of X(n).

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Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **EXTC**

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: ETE702 and Course Name: Statistical Signal Processing

Time: 2 hour Max. Marks: 80

==========

Question Number	Correct Option
Q1.	A
Q2.	B
Q3.	B
Q4	D
Q5	C
Q6	D
Q7	D
Q8.	B
Q9.	A
Q10.	A
Q11.	D
Q12.	A
Q13.	C
Q14.	C
Q15.	A
Q16.	D
Q17.	D
Q18.	B
Q19.	B
Q20.	C

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Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: BE Final Year Engineering

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: ETE704 and Course Name: CMOS Analog and Mixed Signal VLSI Design

Time: 2 hours Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Switched Capacitor Amplifier operation takes place in two phases i.e. _____ and _____.
Option A:	Quantization and amplification
Option B:	Sampling and amplification
Option C:	Sampling and quantization
Option D:	Quantization and Discretization
2.	The MOSFET is said to be in diode connected configuration if:
Option A:	Drain and gate are connected
Option B:	Source and gate are connected
Option C:	A diode is placed between source and ground
Option D:	A diode is placed between supply and drain
3.	Charge Injection gives rise to _____, _____ and _____ types of errors in MOS sampling circuits
Option A:	Gain error, dc offsets , Nonlinearity
Option B:	Power loss, speed error, ac offsets
Option C:	Ac offsets, body effect , figure of merit
Option D:	Speed error, body effect, ac offsets
4.	Flicker noise is found in MOSFET at:
Option A:	Gate and oxide interface
Option B:	Gate oxide and silicon interface
Option C:	Source and substrate interface
Option D:	Drain and substrate interface
5.	Cascode Stage in the single stage amplifier is the combination is _____.
Option A:	Common Source + Common Gate
Option B:	Common Gate + Common gate
Option C:	Common Source + Common Source
Option D:	Common Gate + P-MOSFET
6.	NMOS transistor works as
Option A:	current sink
Option B:	current source
Option C:	both current sink as well as source

Option D:	voltage controlled voltage source
7.	In ideal Operational Transconductance Amplifier
Option A:	Input resistance is infinity and output resistance is zero
Option B:	Input resistance is infinity and output resistance is infinity
Option C:	Input resistance is zero and output resistance is zero
Option D:	Input resistance is zero and output resistance is infinity
8.	Switching voltage of CMOS open loop comparator is
Option A:	proportional to frequency of input signal
Option B:	Inversely proportional to gain of comparator
Option C:	Independent of gain of comparator
Option D:	Directly proportional to gain of comparator
9.	Input impedance of MOSFET amplifier in Common Source configuration is:
Option A:	Very high at high frequencies
Option B:	Very low at high frequencies
Option C:	Very high at low frequencies
Option D:	Very low at low frequencies
10.	When gate to source voltage of common source amplifier is at positive peak, drain to source voltage will be
Option A:	infinite
Option B:	zero
Option C:	at positive peak
Option D:	at negative peak
11.	Which transistor bias circuit arrangement provides good stability using negative feedback from collector to base
Option A:	base bias
Option B:	emitter bias
Option C:	collector-feedback bias
Option D:	voltage-divider bias
12.	In NMOS CS Amplifier load is diode connected PMOS transistor with (W/L) of NMOS transistor is 4 times (W/L) of diode connected PMOS transistor and mobility of electrons is 4 times of mobility of holes then magnitude of gain is
Option A:	4
Option B:	8
Option C:	16
Option D:	20
13.	In practical differential amplifier output depends
Option A:	only on differential input signal
Option B:	only on common mode input signal
Option C:	on both differential input signal and common mode input signal
Option D:	on only input noise signal
14.	Switched capacitor circuits are used to replace
Option A:	Inductor

Option B:	Capacitor
Option C:	Resistor
Option D:	Conductor
15.	In SAR ADC hold time of Sample and Hold circuit should be
Option A:	Greater than conversion time
Option B:	Less than conversion time
Option C:	Independent of conversion time
Option D:	Equal to sample time
16.	A MOS device operating in a deep triode region behaves as a _____.
Option A:	Diode
Option B:	Resistor
Option C:	Capacitor
Option D:	MOSFET
17.	Find out the resolution of 8 bit DAC/ADC?
Option A:	562
Option B:	662
Option C:	256
Option D:	265
18.	Find the resolution of a 10-bit AD converter for an input range of 10v?
Option A:	9.77mV
Option B:	97.7mV
Option C:	0.977mV
Option D:	977mV
19.	Find the number of input combinations, value for 1LSB , percentage accuracy and the full scale voltage generated for 3 bit DAC, assuming Vref = 5V
Option A:	8 , 19.5mV, 0.391 , 4.10
Option B:	8 , 0.625V, 12.5, 4.375
Option C:	8 , 0.625V, 10 , 4.4
Option D:	8 , 19.5mV, 15.25, 4.235
20.	Source followers exhibit a _____ input impedance and _____ output impedance.
Option A:	High, low
Option B:	High, moderate
Option C:	moderate , high
Option D:	Low , moderate

Q2 **(20 Marks)**	**Solve any 2 (10 marks each)**
1	Compare common source stage with Resistive Load, Diode Connected Load, Current Source load and Source degeneration
2	Analyze Large signal behavior of differential amplifier in detail with proper diagram and derivation

3	Explain white noise and flicker noise in MOSFET. Derive equation for output and input referred noise voltage of CS Stage.

Q3 (20 Marks)	**Solve any Two** **10 marks each**
1	Explain operational transconductance amplifier (OTA) and compensation technique for operational amplifier in detail with neat diagrams
2	Design a 3-bit flash converter, listing the values of the voltages at each resistor tap and draw the transfer curve for Vin= 0 to 5V. Assume VREF =5V.
3	Write short note any 2 1) Bandgap Voltage reference 2) First and second order switched capacitor circuits 3) Mixed signal layout issues

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Program: **BE Final Year Engineering**

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: ETE704 and Course Name: CMOS Analog and Mixed Signal VLSI Design

Time: 2 hour Max. Marks: 80

==========

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	A
Q3.	A
Q4	B
Q5	A
Q6	A
Q7	B
Q8.	D
Q9.	C
Q10.	D
Q11.	C
Q12.	A
Q13.	C
Q14.	C
Q15.	A
Q16.	B
Q17.	C
Q18.	A
Q19.	B
Q20.	B

University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Electronics and Telecommunication Engg.

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: ETE701 and Course Name: Data Compression and Encryption

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Huffman tree uses the _____ of each character to work out their encoding
Option A:	Frequency
Option B:	Order in ASCII
Option C:	Number value
Option D:	Bits
2.	Which coding technique exhibit/s the usability of fixed length codes?
Option A:	Lempel Ziv
Option B:	Huffman
Option C:	Run length
Option D:	Shannon fano
3.	Sequence of binary digits assigned to symbol, is called as _____
Option A:	Byte
Option B:	Octet
Option C:	Codeword
Option D:	Codeset
4.	The second phase of JPEG is _____
Option A:	DCT transformation
Option B:	Quantization
Option C:	Data compression
Option D:	Scaling
5.	Which of the following techniques is used for video compression?
Option A:	MPEG
Option B:	JPEG
Option C:	DCT
Option D:	Adaptive Huffman technique
6.	Compressed image can be recovered back by _____
Option A:	Image enhancement
Option B:	Image contrast

Option C:	Image decompression
Option D:	Image equalization
7.	In Video Compression, an independent frame that is not related to any other frame is called _____
Option A:	B-frame
Option B:	C-frame
Option C:	P-frame
Option D:	I-frame
8.	In Joint Photographic Experts Group (JPEG), a grayscale picture is divided into blocks of _____
Option A:	6 X 6 pixels
Option B:	7 X 7 pixels
Option C:	8 X 8 pixels
Option D:	9 X 9 pixels
9.	Digital video is sequence of _____
Option A:	Pixels
Option B:	Matrix
Option C:	Frames
Option D:	Coordinates
10.	Which among the following compression techniques is intended for still images?
Option A:	MPEG
Option B:	JPEG
Option C:	H.263
Option D:	Shannon fano
11.	What is the data encryption standard (DES)?
Option A:	Block cipher
Option B:	Stream cipher
Option C:	Bit cipher
Option D:	Byte cipher
12.	AES uses a _____ bit block size and a key size of _____ bits.
Option A:	127; 127
Option B:	64; 64 or 128
Option C:	128; 128, 192, or 256
Option D:	255; 127, 191 or 255
13.	Cryptographic hash function takes an arbitrary block of data and returns_____
Option A:	Fixed size bit string
Option B:	Variable size bit string
Option C:	Variable sized byte string
Option D:	Public key
14.	What is Cryptanalysis?

Option A:	To calculate efficiency for cryptography
Option B:	To find some insecurity in a cryptographic scheme
Option C:	To increase the speed
Option D:	To decrypt the data
15.	The _____ method provides a one-time session key for two parties
Option A:	Diffie-Hellman
Option B:	RSA
Option C:	DES
Option D:	AES
16.	In the RSA algorithm, we select 2 random large values ‘p’ and ‘q’. Which of the following properties must be satisfied by ‘p’ and ‘q’?
Option A:	p and q should be divisible by Φ(n)
Option B:	p and q should even numbers
Option C:	p and q should be prime
Option D:	p/q should give no remainder
17.	Certification of digital signature by an independent authority is needed because;
Option A:	It is safe
Option B:	It gives confidence to a business
Option C:	Private key claimed by a sender may not be actually his
Option D:	The authority checks and assures customers that the public key indeed belongs to the business which claims its ownership
18.	Which malicious program cannot do anything until actions are taken to activate the file attached by the malware?
Option A:	Trojan Horse
Option B:	Worm
Option C:	Virus
Option D:	Bots
19.	SSL stands for _____
Option A:	Serial Session Layer
Option B:	Secure Socket Layer
Option C:	Session Secure Layer
Option D:	Series Socket Layer
20.	For a client-server authentication, the client requests from the KDC a _____ for access to a specific asset
Option A:	Ticket
Option B:	Local
Option C:	Token
Option D:	User

Q2	Solve any Two Questions out of Three 10 marks each
A	Consider a source X = {a,b,c,d} with probabilities; p(a) = 0.2, p(b) = 0.3, p(c) = 0.1, p(d) = 0.4. Calculate standard Huffman code ,average codeword length and efficiency for Huffman code. Also encode sequence 'abcad' using Huffman code
B	Explain the principle of working of MP-3 audio compression standard with a neat block diagram
C	Draw and explain the working of JPEG image compression standard.

Q3	Solve any Two Questions out of Three 10 marks each
A	How AES encryption algorithm is used to encrypt and decrypt the data at transmitter and receiver end?
B	What is Diffie Hellman Key Exchange ? Explain in brief with an example
C	Short note on- (i) Intruders and viruses (ii) Firewall design

University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Electronics & Telecommunication Engg.

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: ETE701 and Course Name: Data Compression and Encryption

Time: 2 hour Max. Marks: 80

==========

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	A
Q3.	C
Q4	B
Q5	A
Q6	C
Q7	D
Q8.	C
Q9.	C
Q10.	B
Q11.	A
Q12.	C
Q13.	A
Q14.	B
Q15.	A
Q16.	C
Q17.	D
Q18.	C
Q19.	B
Q20.	A

University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Electronics and Telecommunication Engg.

Curriculum Scheme: Rev2012

Examination: BE Semester:VII

Course Code: ETC701 and Course Name: Image and Video Processing

Time: 2 hour Max. Marks: 80

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following is the best sensor to acquire the digital image in optical range?
Option A:	Point sensor
Option B:	Line sensor
Option C:	Array Sensor
Option D:	Multispectral sensor
2.	If an image has 128 intensity levels, the number of bits per pixel in the image is
Option A:	6
Option B:	5
Option C:	8
Option D:	7
3.	If two images A and B have a sampling rates of 400dpi and 600 dpi, then
Option A:	A has better spatial resolution than B
Option B:	B has more spatial resolution than A
Option C:	Both A and B have same spatial resolution
Option D:	Both A and B have no spatial resolution
4.	Which of the following distance measures is the best?
Option A:	City block distance
Option B:	Chess board distance
Option C:	Euclidean Distance
Option D:	Pixel to boundary distance
5.	Which statement is true with respect to High pass Filter?
Option A:	High Pass filter removes high Frequencies in the image
Option B:	High pass filter removes Gaussian noise from image
Option C:	High Pass filter retains all low frequencies
Option D:	High pass filter enhances the edges
6.	The salt and pepper noise is eliminated by

Option A:	Median filter
Option B:	Low pass filter
Option C:	High pass filter
Option D:	Gaussian filter
7.	Log transformation is used in which of the following applications?
Option A:	To stretch the histogram
Option B:	To improve the contrast of the image
Option C:	To generate image negative
Option D:	To enhance the scale of visibility where the pixel values seem visually very near to each other.
8.	Histogram equalization is not 100% uniform in digital images due to
Option A:	One to one mapping of pixels
Option B:	Due to sampling and quantization process
Option C:	Due to calculation of CDF
Option D:	Due to rounding off of gray levels
9.	The Maxican hat response of the filter is produced by
Option A:	LOG operation
Option B:	Morphological operation
Option C:	High pass filter
Option D:	Homomorphic filter
10.	The erosion by a structuring element [0 1 0; 0 1 0; 0 1 0] on a full bright square image with all the values equal to 250 of gray scale will result in
Option A:	A diagonal bright line
Option B:	A horizontal bright line
Option C:	A vertical bright line
Option D:	The image vanishes completely
11.	The Skeleton of an image is obtained by applying
Option A:	A series of segmentation operations
Option B:	A series of dilation operations
Option C:	A series of connectivity operations
Option D:	A series of erosion operations
12.	The correct equation for illumination Y is given by
Option A:	0.59G +0.3R + 0.11B
Option B:	0.59R + 0.3B+ 0.11G
Option C:	0.6G+ 0.3B+ 0.1R
Option D:	0.59B+ 0.11G+ 0.3R
13.	Which of the following has the best energy compaction?

Option A:	DFT
Option B:	DWT
Option C:	Hadamard Transform
Option D:	K L transform
14.	The following effect is observed in an image when the scaling property of DFT is applied on an image
Option A:	The linear phase changes to nonlinear phase
Option B:	The time period is shifted by some amount
Option C:	The size of the image increases or decreases
Option D:	The rotation of the image changes in diagonal direction
15.	The Hough transform is used to
Option A:	Convert the image from time domain to frequency domain
Option B:	Convert the image from frequency domain to time domain
Option C:	Coordinate space to parametric space
Option D:	Parametric space to spatial coordinate space
16.	The mask [-1 -1 -1; 2 2 2; 1 1 1] when applied to an image results in
Option A:	Detection of diagonal edge
Option B:	Detection of Horizontal edge
Option C:	Detection of vertical edge
Option D:	Does not detect any edge
17.	The MPEG is the standard used to represent
Option A:	An audio compression
Option B:	Image compression
Option C:	Video compression
Option D:	Is not a compression standard
18.	The motion vector is used to
Option A:	Calculate the distance between two pixels in different frames
Option B:	Calculate the distance between two pixels in same frame
Option C:	Calculate the path between two pixel values
Option D:	Calculate the distance between two pixels for face recognition
19.	The coding most suitable for coding video is
Option A:	Delta modulation coding
Option B:	Pulse code modulation
Option C:	Huffman coding
Option D:	Predictive coding
20.	The number of frames per second used in motion pictures are
Option A:	50 frames/ second

Option B:	30 frames / second
Option C:	24 frames/ second
Option D:	72 frames/ second

Q.2	**Solve any Two Questions out of Three 10 marks each**
A	State and prove the following DFT properties 1. Linearity Property 2. Convolution property
B	Derive the equation for histogram equalization and prove that the equalized histogram represents uniform distribution.
C	Explain any one method of motion vector calculation.

Q.3	**Solve any Two Questions out of Three 10 marks each**
A	Apply median filter on the following image
B	Draw different masks used for edge detection and compare their performance with justification.
C	Compare the performance of Gradient operator and Laplacian operator? Which is the best for edge detection?

29	31	0	10	25	0
10	20	30	15	25	5
5	10	15	10	25	30
30	25	10	5	15	0
0	5	0	10	5	15
15	25	0	0	10	15
30	20	10	15	0	5

University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021to 26th June 2021

Program: **Electronics and Telecommunication**

Curriculum Scheme: R2012

Examination: BE Semester VII

Course Code: ETC701 Course Name: Image and Video Processing

Time: 2 hour Max. Marks: 80

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	C
Q2.	D
Q3.	B
Q4	C
Q5	D
Q6	A
Q7	D
Q8.	B
Q9.	A
Q10.	C
Q11.	D
Q12.	A
Q13.	D
Q14.	C
Q15.	C
Q16.	B
Q17.	C
Q18.	A
Q19.	D
Q20.	C

University of Mumbai

Examination June 2021

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: _ETC 704 and Course Name: Microwave and Radar Engineering

Time: 2 hour Max. Marks: 80

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Reflex klystron is a _____
Option A:	Amplifier
Option B:	Oscillator
Option C:	Attenuator
Option D:	Filter
2.	The purpose of magnet which surrounds Travelling Wave Tube is-------
Option A:	Accelerate the electron beam
Option B:	Hold electron beam from spreading out
Option C:	Modulate the velocity of electron beam
Option D:	Slowdown the electromagnetic wave on the helix
3.	A travelling wave tube has gain parameter 2.92 x10^-2 and number of turns in helix is 50 . The output power gain of TWT is -----.
Option A:	56.25dB
Option B:	59.52dB
Option C:	5.952dB
Option D:	58.25 dB
4.	Bunching process can be graphically explained by a curve or diagram
Option A:	input resonator electrical field vs.electron density
Option B:	electron density vs. distance from input gap
Option C:	velocity diagram called Applegate diagram
Option D:	repeller voltage against output voltage
5.	Which of the following is the main advantage of microwave
Option A:	Highly directive
Option B:	Moves at the speed of light
Option C:	Greater S/N ratio
Option D:	High penetration power
6.	_____ is the best medium for handling the large microwave power
Option A:	Coaxial line
Option B:	Rectangular wave guide
Option C:	Strip line
Option D:	Microstrip line

7.	HEMT(High Electron Mobility Transistor) used in microwave circuit is a _____
Option A:	Source
Option B:	Detector
Option C:	High power amplifier
Option D:	Low noise amplifier
8.	Which of the following is the biggest advantage of the TRAPATT diode over IMPATT diode
Option A:	Low Noise
Option B:	High efficiency
Option C:	Ability to operate at high frequencies
Option D:	Lesser sensitivity to harmonics
9.	For which of the following application, the Varactor diode is not useful at microwave frequencies
Option A:	For electronic tuning
Option B:	For frequency multiplication
Option C:	As an Oscillator
Option D:	As a parametric amplifier
10.	Which of the following is the semiconductor diode which can be used in switching circuits at microwave range
Option A:	PIN diode
Option B:	Tunnel diode
Option C:	Varactor diode
Option D:	Gunn diode
11.	A Magic – Tee is nothing but
Option A:	Modification of E- Plane tee
Option B:	Modification of H- Plane tee
Option C:	Combination of E- plane & H- plane
Option D:	Two E- plane tees connected in parallel
12.	For transverse electromagnetic wave propagation, we need a minimum of:
Option A:	1 conductor
Option B:	2 conductors
Option C:	3 conductors
Option D:	bunch of conductors
13.	In shunt stub matching, the key parameter used for matching is:
Option A:	Admittance of the line at a point
Option B:	Admittance of the load
Option C:	Impedance of the stub
Option D:	Impedance of the load
14.	For a load impedance of ZL=60-j80. Design of 2 single-stub shunt tuning networks to match this load to a 50Ω line is to be done. What is the normalized admittance obtained so as to plot it on smith chart?
Option A:	1+j
Option B:	0.3+j0.4
Option C:	0.4+j0.3
Option D:	0.3-j0.4

15.	If a single section quarter wave transformer is used for impedance matching at some frequency, then the length of the matching line is:
Option A:	Is different at different frequencies
Option B:	Is a constant
Option C:	Is λ/2 for other frequencies
Option D:	Is λ/8 for other frequencies
16.	The term radar cross section defines the:
Option A:	Scattering ability of the target
Option B:	Power radiating ability of the radar
Option C:	Amount of energy scattered by unwanted objects
Option D:	Cross section of radar area through which energy is emitted
17.	A _____ determines the target range by measuring the round trip time of a pulsed microwave signal.
Option A:	Pulse radar
Option B:	Doppler radar
Option C:	Cross section radar
Option D:	CW Radar
18.	The receiver model of a total power radiometer is based on the:
Option A:	AM receiver
Option B:	FM receiver
Option C:	Super heterodyne receiver
Option D:	SONAR
19.	In pulsed radar set, the function of Duplexer is to
Option A:	Aid in calibrating the display unit
Option B:	prevent frequency drift in the klystron
Option C:	Allow the transmitter and the receiver to operate from a common antenna
Option D:	To protect the klystron from heating
20.	Which of the following is NOT a part of the microwave heating system?
Option A:	Magnetron
Option B:	Anode
Option C:	Cathode
Option D:	IMPATT Diode

Q2 and Q3. **(20 Marks Each)**	
2A	**Solve any Two (5 marks each)**
i.	Enumerate and explain the advantage and application of Microwaves
ii.	Explain the terms frequency pushing and frequency pulling with reference to Magnetron.
iii.	Explain Instrument Landing System.

B	**Solve any One (10 marks each)**
i.	An air filled circular waveguide having an inner radius of 1cm is existed in dominant mode at 10 GHz. Find (a) the cutoff frequency of dominant mode, (b) guide wavelength (c) wave impedance. Find the bandwidth for operation in dominant mode only.
ii.	With suitable block diagram explain the working of Conical Scan tracking radar.
Q3	
A	**Solve any Two (5 marks each)**
i.	Differentiate between Transit time devices and Transferred electron devices.
ii.	Explain Doppler shift and its role in pulsed and CW Radar.
iii.	What is quarter wave transformer? Explain its use in microwave.
B	**Solve any One (10 marks each)**
i.	Describe the mechanism of velocity modulation in a two cavity Klystron and hence obtain an expression for bunched beam current. Also find out condition for maximum power output.
ii.	Explain the working of negative resistance parametric amplifier.

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Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: _ETC 704 and Course Name: Microwave and Radar Engineering_

Time: 2 hour Max. Marks: 80

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Q1:

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	B
Q3.	B
Q4	C
Q5	A
Q6	B
Q7	D
Q8.	B
Q9.	C
Q10.	A
Q11.	C
Q12.	B
Q13.	A
Q14.	B
Q15.	A
Q16.	A
Q17.	A
Q18.	C
Q19.	C
Q20.	D