

University of Mumbai

Examination June 2021

Examinations Commencing from 1st June 2021

Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev2016

Examination: BE Semester VI

Course Code: **ECC DLO 6022** and Course Name: **Radar Engineering**

Time: 2 hours

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	When a power P is transmitted by an antenna with a gain G and a distance R between the transmitting and receiving antennas, amount of energy incident on the receiving antenna is given by the expression
Option A:	$PG/4\pi R^2$
Option B:	$P/4\pi R^2$
Option C:	$4\pi PR^2/G$
Option D:	PG/R
2.	A _____ determines the target range by measuring the round trip time of a pulsed microwave signal.
Option A:	Cross section radar
Option B:	Doppler radar
Option C:	Pulse radar
Option D:	FMCW radar
3.	A duplexer is a
Option A:	signal side band filter
Option B:	transmit-receive switch
Option C:	balanced mixer
Option D:	IF-log amplifier
4.	A simple CW radar does not give range information because
Option A:	it uses the principle of Doppler shift
Option B:	continuous echo cannot be associated with any specific part of the transmitted wave
Option C:	CW waves do not reflect from a target
Option D:	None of the above
5.	If the transmitted waveform is a train of rectangular pulses of width 2 microseconds, the pulse repetition period is 1 millisecond and the peak power is 10 kilowatts, the average power is
Option A:	2
Option B:	20
Option C:	200
Option D:	2000

6.	MST Radar is used for
Option A:	Weather Forecasting
Option B:	Remote sensing
Option C:	Fire controlling
Option D:	House keeping
7.	Higher pulse repetition frequency (P.R.F.) in a radar will
Option A:	increase the range of the radar
Option B:	make weak signal discernible
Option C:	improves the signal-to-noise ratio of the system
Option D:	Increase the frequency of the radar
8.	Which of the following systems use a collection of radio transmitting stations to guide an aircraft to a particular runway?
Option A:	ILS
Option B:	GPS
Option C:	VOR
Option D:	RADAR
9.	How many ILS systems does an airport require?
Option A:	0
Option B:	1
Option C:	Depends upon aircraft size
Option D:	Depends upon density of traffic on the airspace
10.	If the ratio of the antenna diameter to the wavelength in a radar system is high this will result in (indicate the false statement)
Option A:	large maximum range
Option B:	good target discrimination
Option C:	difficult target acquisition
Option D:	increased capture area
11.	The IF bandwidth of a radar receiver is inversely proportional to the
Option A:	pulse width
Option B:	pulse repetition frequency
Option C:	pulse interval
Option D:	square root of the peak transmitted power
12.	After a target has been acquired, the best scanning system for tracking is
Option A:	Nodding
Option B:	Spiral
Option C:	Conical
Option D:	Helical
13.	The A scope displays
Option A:	the target position and range
Option B:	the target range, but not position
Option C:	the target position, but not range
Option D:	neither range nor position, but not only velocity

14.	RADAR stands for
Option A:	Radiation Detection and Ranging
Option B:	Radio Detection and Ranging
Option C:	Radio Detection and reception
Option D:	Radiation detection and reception
15.	The klystron tube used in a klystron amplifier is a _____ type beam amplifier.
Option A:	Linear beam
Option B:	Crossed field
Option C:	Parallel field
Option D:	None of the mentioned
16.	In a magnetron, the output frequency is determined by the
Option A:	Acceleration of the electron beam
Option B:	Amount of DC voltage applied
Option C:	Dimensions of the resonant cavities
Option D:	Length of the cathode
17.	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
18.	Pulse radar operating at 10GHz frequency has an antenna with a gain of 28 dB and a transmitted power of 2kW. If it is desired to detect a target of cross section 12m ² , and the minimum detectable signal is -90 dBm, the maximum range of the radar is:
Option A:	8114 m
Option B:	2348 m
Option C:	1256 m
Option D:	4563 m
19.	If peak transmitted power in a radar system is increased 16 times, its maximum range will be increased by a factor of
Option A:	2
Option B:	4
Option C:	8
Option D:	16
20.	In a radar transmitter, the function of modulator is to
Option A:	allow the use of same antenna for transmission and reception
Option B:	switch the tube OFF and ON as required
Option C:	control pulse repetition frequency (PRF)
Option D:	increase maximum range of the radar

Q2	
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A	Solve any Two	5 marks each
i.	Explain Frequency Agility and Diversity technique.	
ii.	Explain which factors govern the pulse repetition frequency.	
iii.	Explain radar range equation.	
B	Solve any One each	10 marks
i.	Draw and explain Travelling wave tube amplifier used in radar transmitter.	
ii.	Draw block diagram of MTI radar and explain each block in detail.	

Q3.		
A	Solve any Two	5 marks each
i.	Compare CW radar with Frequency Modulated Radar	
ii.	Compare Low power and high power radar transmitter along with their applications	
iii.	What do you mean by radar cross section?	
B	Solve any One each	10 marks
i.	With the help of a detailed block diagram explain conical scanning used in radar systems.	
ii.	Give the importance of match filter of radar and discuss them in detail.	