Code No: **R41044** **R10** **Set No. 1**

IV B.Tech I Semester Regular/Supplementary Examinations, Nov/Dec - 2015

RADAR SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1	a)	Derive the range equation for a radar system.	[8]
	b)	What do you understand by maximum unambiguous range? List the various applications of pulse radar.	[7]
2	a)	Determine the peak power and duty cycle of a radar whose average transmitter power is 100 W, pulse width of 0.5μs and pulse repetition frequency of 2000 Hz.	[8]
	b)	Write notes on "Integration of Radar Pulses".	[7]
3	a)	Explain in detail how FMCW radar is used for measurement of range.	[8]
	b)	Explain the various measurement errors in FMCW radar.	[7]
4	a)	Draw the block diagram and explain the working of MTI radar.	[8]
	b)	What is a delay line canceller? Explain the same with a neat block diagram.	[7]
5	a)	Explain the working of phase comparison tracking radar.	[8]
	b)	Describe the sequential lobbing method of tracking of an acquired target.	[7]
6	a)	Explain Cosecant-Squared Antenna Pattern used in Radar.	[8]
	b)	Explain the following: i). Aperture efficiency ii). Polarisation	[7]
7	a)	What are the different detection theories? Explain them in brief.	[8]
	b)	What do you understand by correlation detection?	[7]
8	a)	Explain how Circulators can be used as Duplexers.	[8]
	b)	With neat diagrams differentiate Series feeds from Parallel Feeds.	[7]

Code No: **R41044** **R10** **Set No. 2**

IV B.Tech I Semester Regular/Supplementary Examinations, Nov/Dec - 2015

RADAR SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1	a)	Using a block diagram explain the working of a pulse radar.	[8]
	b)	Calculate the average power when the peak power is 200kW, pulse width is 2 and the rest time is 2000 seconds.	[7]
2	a)	Find the pulse repetition frequency of a radar in order to achieve a maximum unambiguous range of 50 nmi and if the radar has a peak power of 600 kW, what is its average power with a pulse width of 1.8 μs.	[8]
	b)	Explain the concept of "PRF and Range Ambiguities".	[7]
3	a)	Explain the operation of a FM-CW altimeter using a block diagram.	[8]
	b)	Write short notes on limitations of CW radar.	[7]
4	a)	Using a block diagram, explain the working of Range Gated Doppler Filters.	[8]
	b)	A CW radar (MTI) ia operating at a PRF of 1 KHz. Find the lowest blind speed, if it is operating at 2 cm` wavelength.	[7]
5	a)	Explain with block diagram of conical scan tracking radar.	[8]
	b)	Explain with neat diagrams the concept of GLINT.	[7]
6	a)	Write notes on Electronically Steered Phased Array Antennas.	[8]
	b)	Write notes on Radomes.	[7]
7	a)	Obtain derivations of matched-filter characteristics of a receiver.	[8]
	b)	Draw constant false alarm rate (CFAR) radar receiver. Explain its working.	[7]
8	a)	Explain in detail Noise figure and Noise temperature for the radar receivers.	[8]
	b)	Write short notes on Phased Array Antennas.	[7]

Code No: **R41044** **R10** **Set No. 3**

IV B.Tech I Semester Regular/Supplementary Examinations, Nov/Dec - 2015

RADAR SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1	a)	What are the various factors affecting the radar range?	[8]
	b)	Derive the simple form of radar range equation and relate the transmitter peak power Pt to the maximum range of the radar	[7]
2	a)	Explain "Radar Cross Section of Targets" in a radar.	[8]
	b)	Using suitable diagrams, explain the importance of "Minimum Detectable Signal" in radar.	[7]
3	a)	A target with radial velocity of 100 Km/hr closes to the CW radar, which is operated at 20 GHz. Calculate the doppler frequency of the target.	[8]
	b)	Using a block diagram, explain the operation of a CW radar.	[7]
4	a)	What is blind speed? How can it be overcome practically in a radar system?	[8]
	b)	Differentiate between MTI and pulse doppler radar.	[7]
5	a)	Compare different types of tracking radars.	[8]
	b)	How is the conical scanning an improvement over lobe switching?	[7]
6	a)	Write short notes on Frequency–scan Arrays in a radar.	[8]
	b)	Explain the following: i). Directive gain ii). Polarisation	[7]
7	a)	Explain cell averaging CFAR with block diagram.	[8]
	b)	What is the effect of S/N ratio over the detection of weak signals?	[7]
8	a)	Explain the principle and working of a balanced duplexer.	[8]
	b)	Using neat diagrams explain the working of a superheterodyne radar receiver.	[7]

Code No: **R41044** **R10** **Set No. 4**

IV B.Tech I Semester Regular/Supplementary Examinations, Nov/Dec - 2015

RADAR SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

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1	a)	Discuss the basic principle of operation of radar using a neat block diagram.	[8]
	b)	List the applications of Radar system.	[7]
2	a)	Write notes on system losses in Radar system.	[8]
	b)	Explain the various noise found in the radar receiver.	[7]
3	a)	A CW radar operating at 5 cm wavelength and target radial velocity is 200 Knots, calculate the doppler frequency of the radar.	[8]
	b)	Explain the need for isolation between transmitter and receiver in a CW radar.	[7]
4	a)	What is Non- coherent MTI radar?	[8]
	b)	A pulse doppler radar has a carrier frequency of 9 G Hz and PRF of 400 Hz. Find the blind doppler frequencies and the radial velocity of the target which would be undetected by the radar.	[7]
5	a)	What do you understand by the term “Tracking radar"?	[8]
	b)	Explain with neat block diagram, "Monopulse Amplitude Tracking Radar"	[7]
6	a)	Write notes on Architectures for Phased Arrays.	[8]
	b)	Write notes on Radomes.	[7]
7	a)	What do you understand by automatic detection and explain the steps involved in this process.	[8]
	b)	What are the different detection theories? Explain them in brief.	[7]
8	a)	Explain a balanced Duplexer with neat diagram.	[8]
	b)	Draw the block diagram of a radar receiver and explain in detail about each block.	[7]